

TM-85309

E83-10282

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LANDSAT-D MISSION SYSTEM INDUSTRY BRIEFING

FEBRUARY 26, 1982



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(E83-10282) LANDSAT-D MISSION SYSTEM
INDUSTRY BRIEFING (NASA) 119 p
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N83-26149

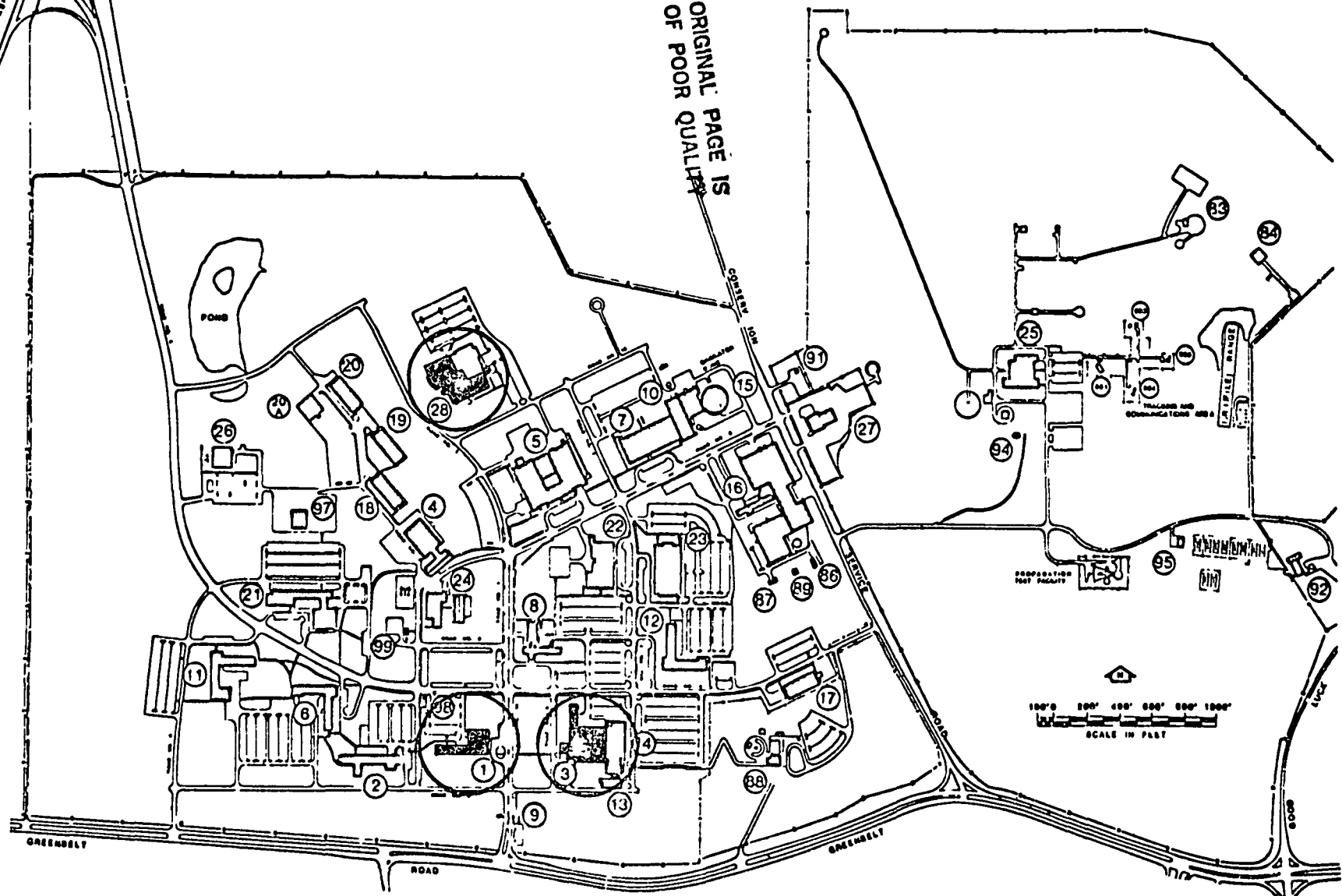
G3/43 00202
Unclas

AGENDA

8:30 - 8:35	OPENING REMARKS	J. BANISZEWSKI CONTRACTING OFFICER
8:35 - 8:45	INTRODUCTION, SCOPE AND PURPOSE	J. BUSSE PROJECT MANAGER
8:45 - 9:15	LANDSAT-D SYSTEM OVERVIEW	J. HAHN GROUND SYSTEMS MANAGER
9:15 - 9:55	LANDSAT-D FLIGHT SEGMENT	T. AEPLI GENERAL ELECTRIC COMPANY
9:55 - 10:05	BREAK	
10:05 - 11:05	LANDSAT-D GROUND SEGMENT	R. GRUBIC GENERAL ELECTRIC COMPANY
11:05 - 11:35	MISSION OPERATIONS	T. HORN GENERAL ELECTRIC COMPANY
11:35 - 12:05	EROS DATA CENTER (EDC)	G. METZ DEPT. OF INTERIOR
12:05 - 1:35	LUNCH/BUILDING 28 TOUR	
1:35 - 2:30	DISCUSSION AND ANSWERS TO QUESTIONS	NASA, NOAA, EDC

GODDARD SPACE FLIGHT CENTER

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LANDSAT-D SYSTEM OVERVIEW

LANDSAT-D FLIGHT SEGMENT

SATELLITES

- o TWO SATELLITES UNDER CONSTRUCTION
- o USES MULTIMISSION MODULAR SPACECRAFT
- o SHUTTLE RETRIEVABLE
- o EXPENDABLES ADEQUATE FOR THREE YEAR MISSION

INSTRUMENTS

- o MULTISPECTRAL SCANNER
 - 4 BAND
 - 80 METER INSTANTANEOUS FIELD OF VIEW
- o THEMATIC MAPPER
 - 7 BAND
 - 30 METER INSTANTANEOUS FIELD OF VIEW

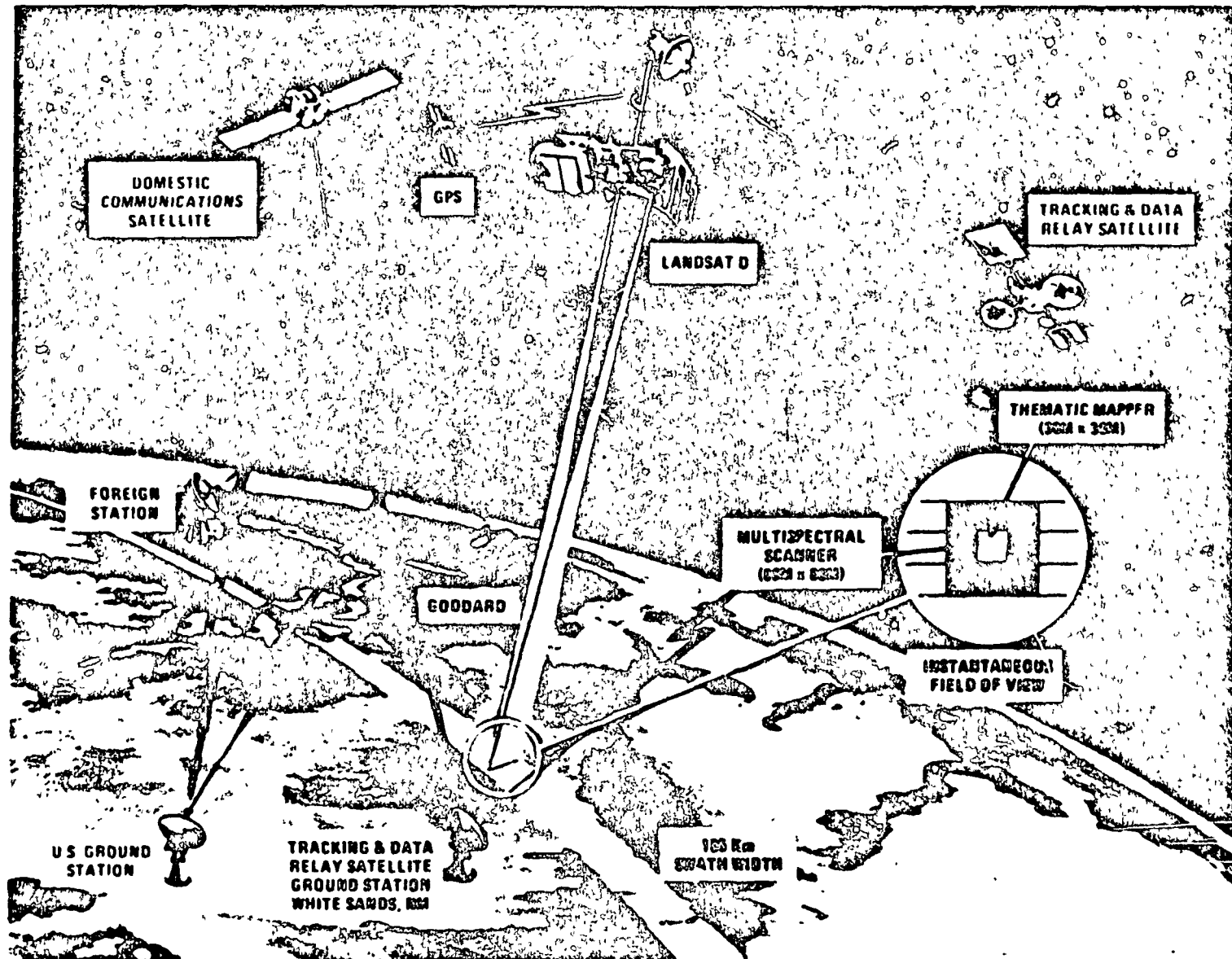
SCENES/DAY

- o NASA (200 MULTISPECTRAL SCANNER; 100 THEMATIC MAPPER)
- o FOREIGN (337 MULTISPECTRAL SCANNER; 150 THEMATIC MAPPER)

ORBIT

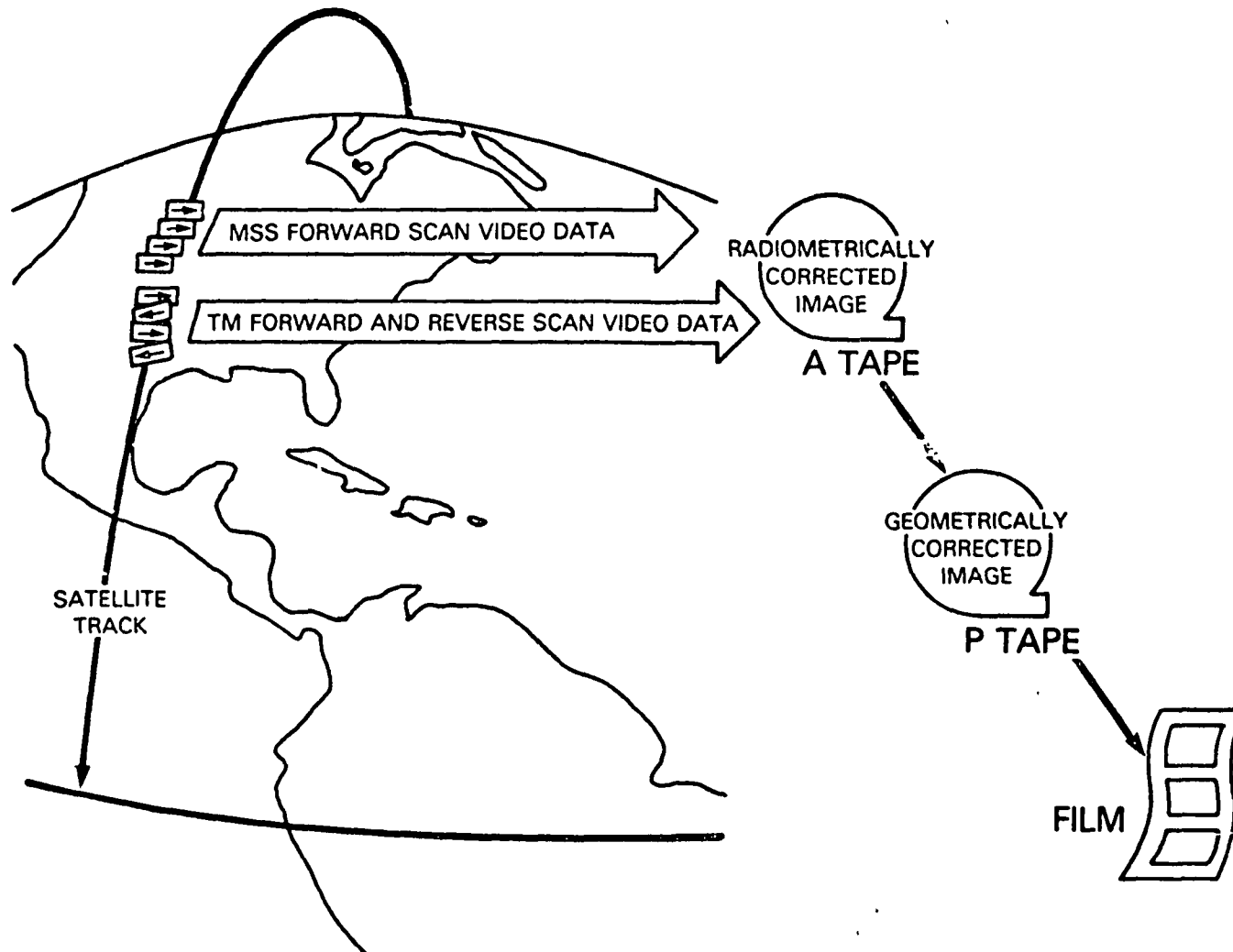
- o ALTITUDE: 705.3 KM
- o DESCENDING NODE: 9:30 - 10:00 AM

LANDSAT-D SYSTEM



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LANDSAT-D GROUND SEGMENT IMAGE PRODUCTS



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LANDSAT-D GROUND SEGMENT IMAGE PRODUCTS

DATA TURNAROUND: ALL PRODUCTS PRODUCED WITHIN 48 HOURS

DATA QUANTITY

0 MULTISPECTRAL SCANNER

- 200 SCENES/PER DAY A TAPES

0 THEMATIC MAPPER

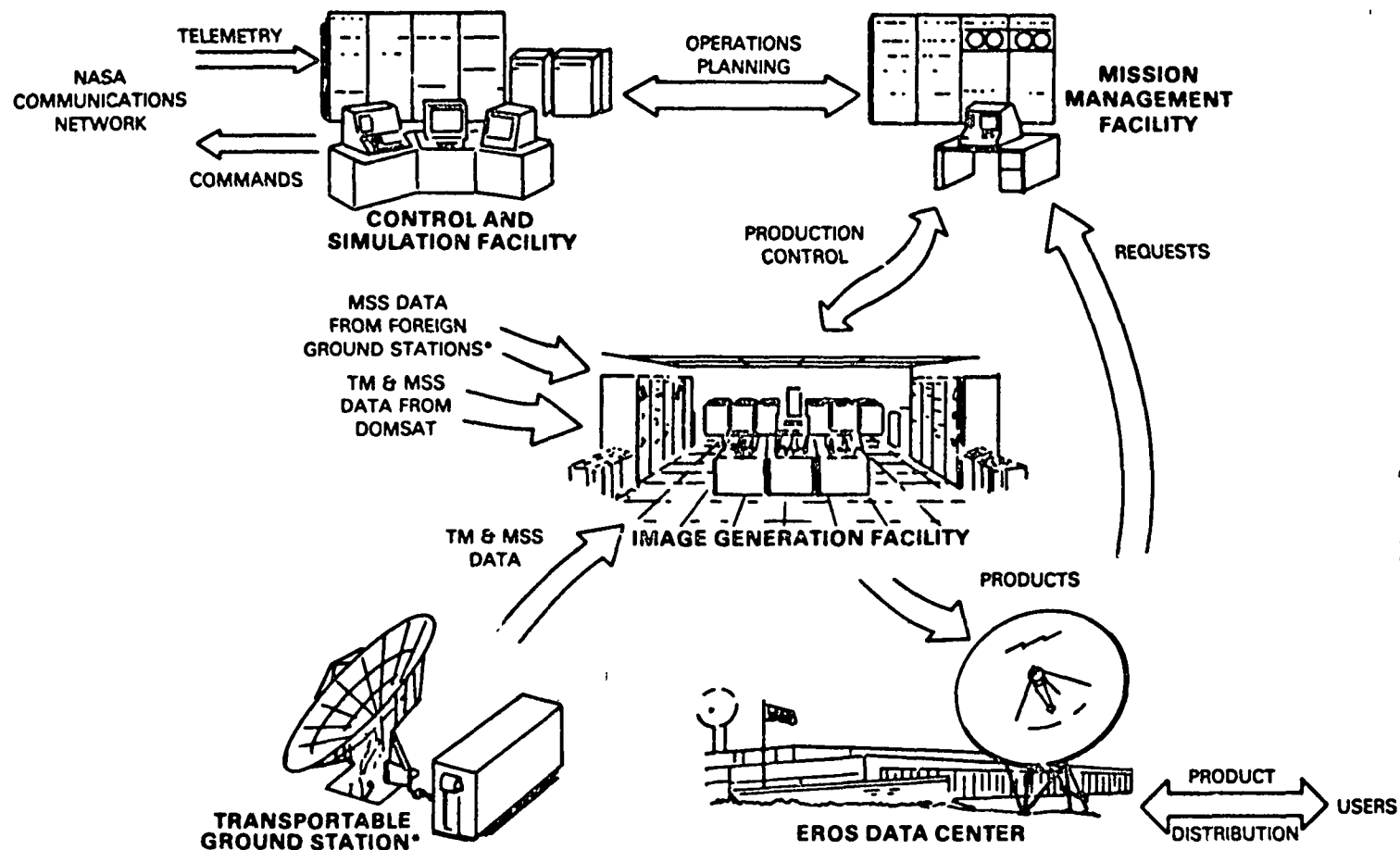
- TM EVALUATION PERIOD: BEGINS JULY 30, 1982
1/SCENE/DAY A TAPE, P TAPE, AND FILM
- TM R&D PERIOD: BEGINS JULY 30, 1983
12 SCENES /DAY A TAPES, P TAPES, AND FILM
- TM OPERATIONAL PERIOD: BEGINS JANUARY 31, 1985
100 SCENES/DAY A TAPES, 50 SCENES/DAY P TAPES AND FILM

DATA QUALITY

- GEODETIC ACCURACY: 0.5 PIXEL (90% OF THE TIME)
- TEMPORAL REGISTRATION: 0.3 PIXEL (90% OF THE TIME)
- RADIOMETRIC CORRECTION: ± 1 QUANTUM LEVEL

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LANDSAT-D GROUND SEGMENT



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* PRIOR TO TDRSS PHASE-IN

MAJOR COMPONENTS OF THE GROUND SEGMENT

MISSION MANAGEMENT FACILITY (MMF)

- O USER INTERFACE
- O PRODUCT PRODUCTION CONTROL
- O PRODUCT DISSEMINATION

CONTROL AND SIMULATION FACILITY (CSF)

- O SPACECRAFT MONITORING AND CONTROL
- O SPACECRAFT SCHEDULING

IMAGE GENERATION FACILITY (IGF)

- O IMAGE RECORDING
- O IMAGE PRODUCTS PRODUCTION

TRANSPORTABLE GROUND STATION (TGS)

- O RECEIVE MSS AND TM IMAGE DATA

EARTH RESOURCES OBSERVATIONS SYSTEMS (EROS) DATA CENTER

- O PROVIDES SINGLE USER INTERFACE
- O PRODUCES CUSTOM USER PRODUCTS

- * UNDER THE DIRECTION OF THE DEPARTMENT OF INTERIOR'S
U.S. GEOLOGICAL SURVEY

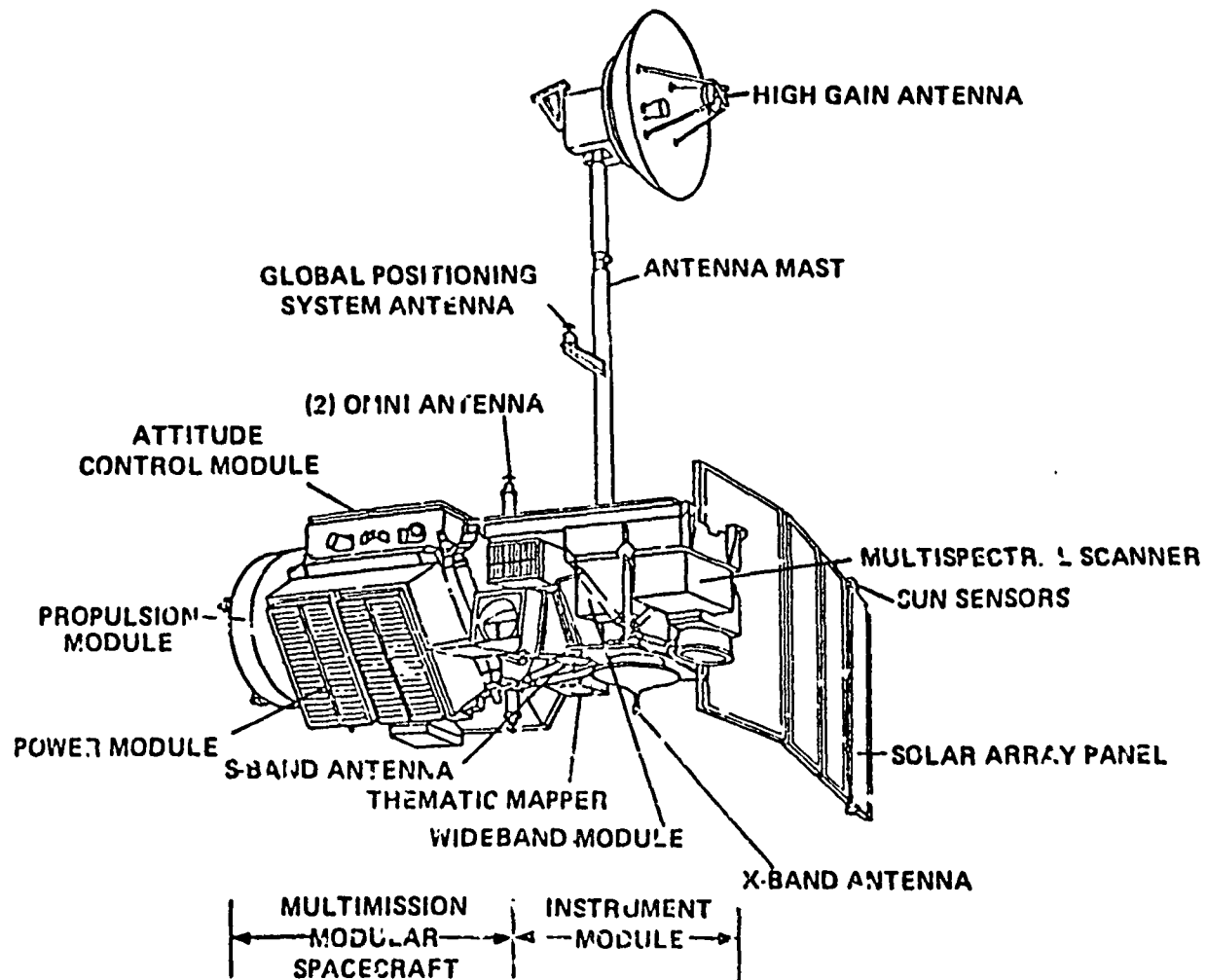
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TLM Telemetry
CCT Computer Compatible
TDRS Tracking and Data Relay System
TM Thematic Mapper

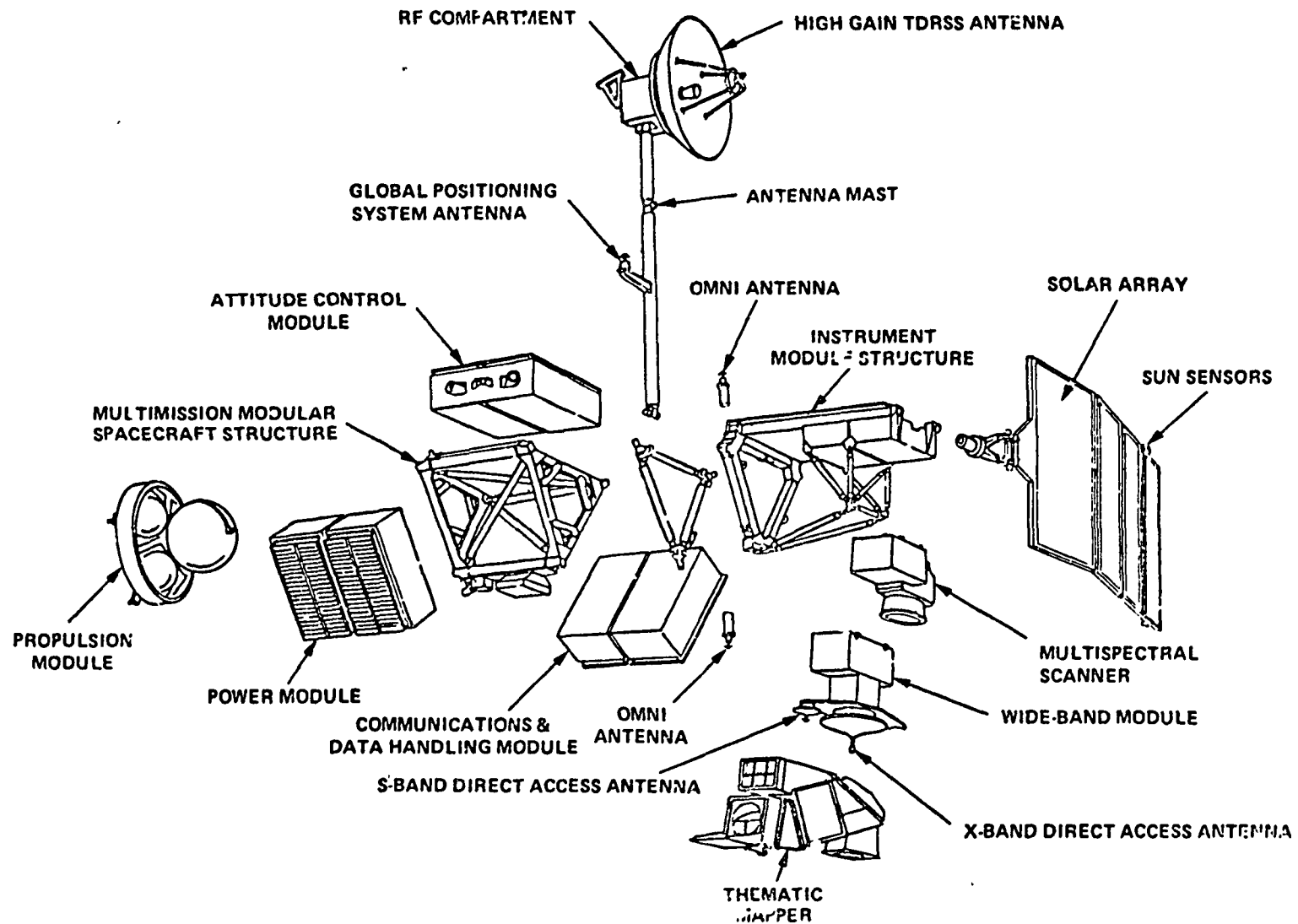
**LANDSAT-D
FLIGHT SEGMENT**

LANDSAT D FLIGHT SEGMENT



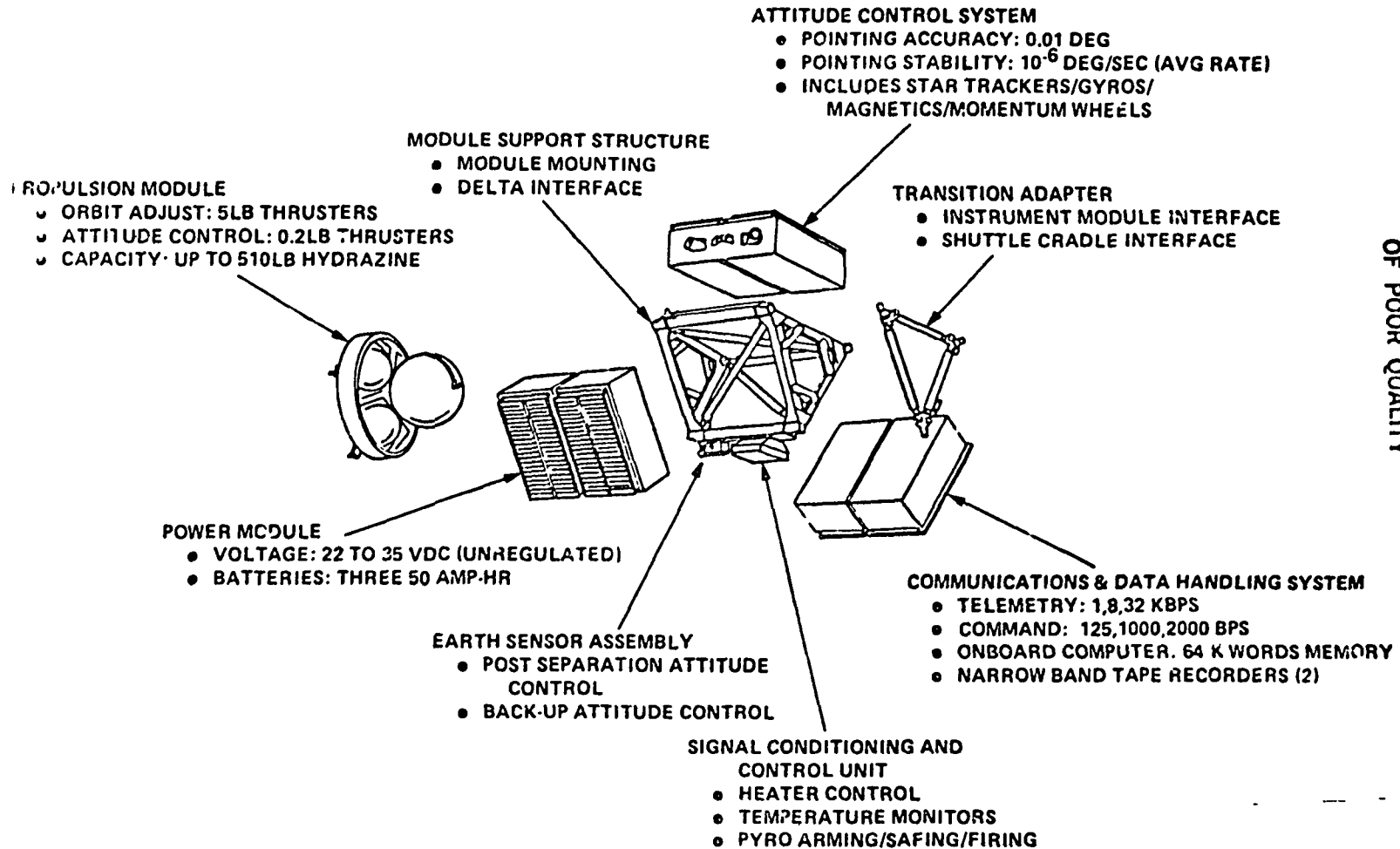
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MODULAR DESIGN OF LANDSAT D



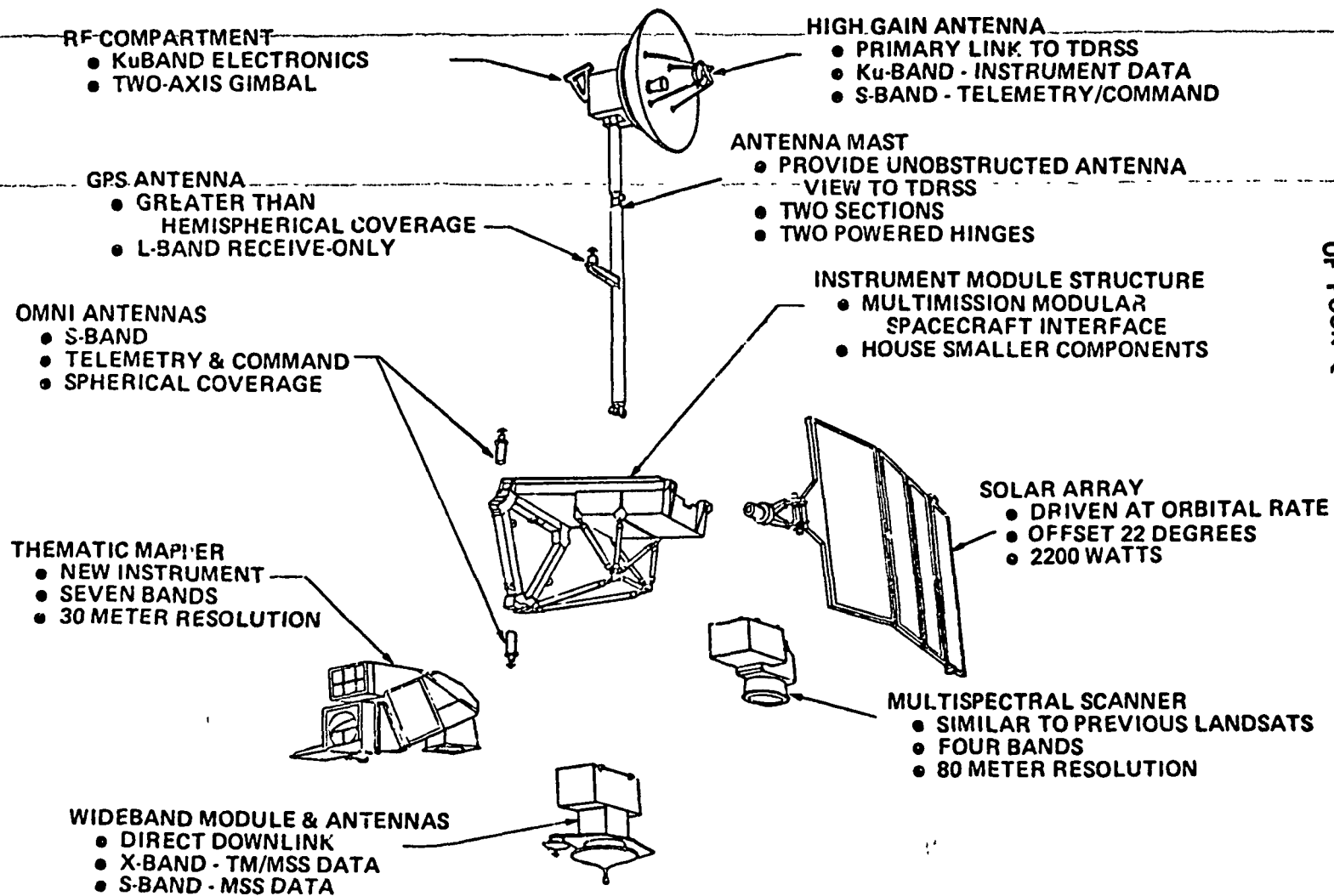
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MULTIMISSION MODULAR SPACECRAFT



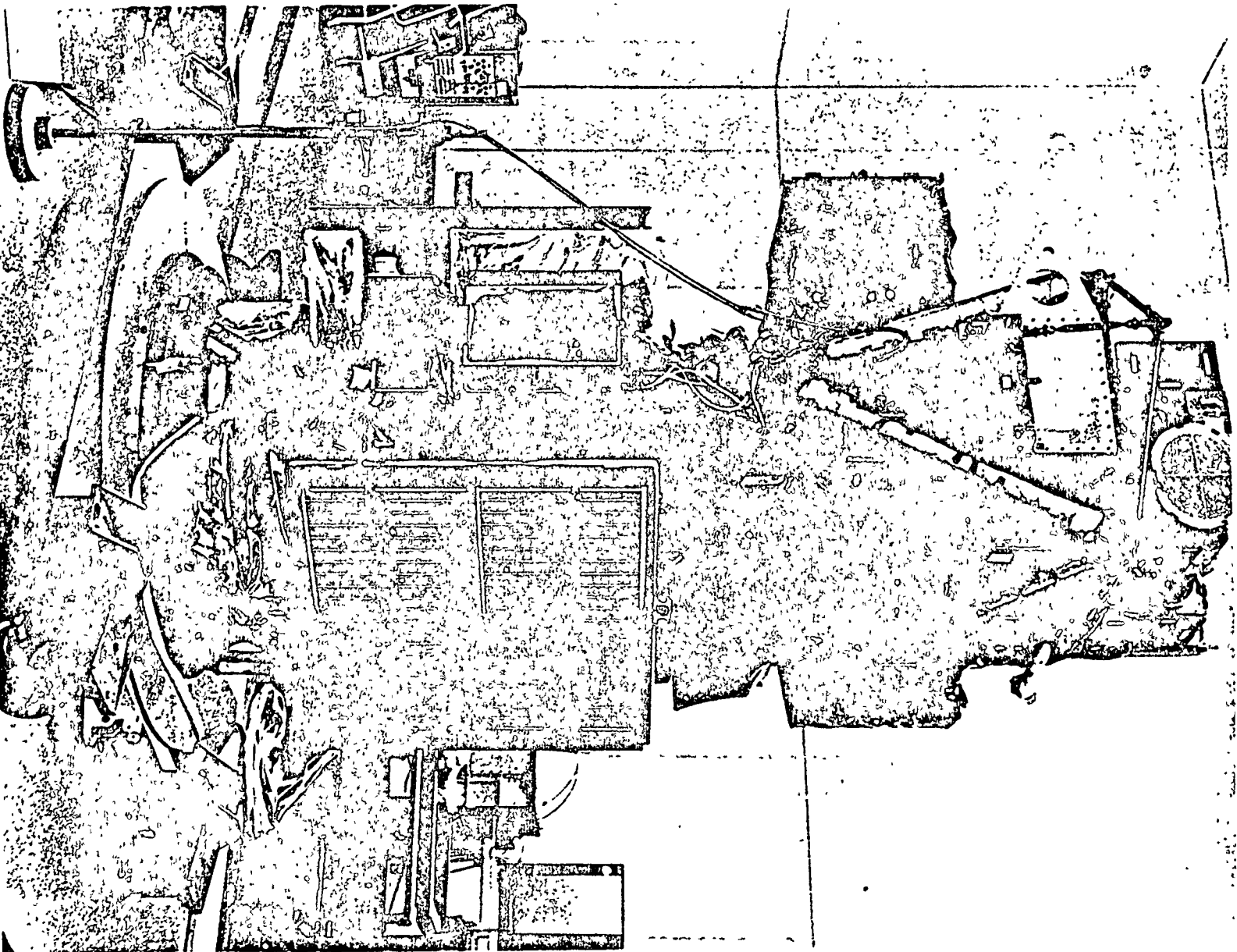
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INSTRUMENT MODULE

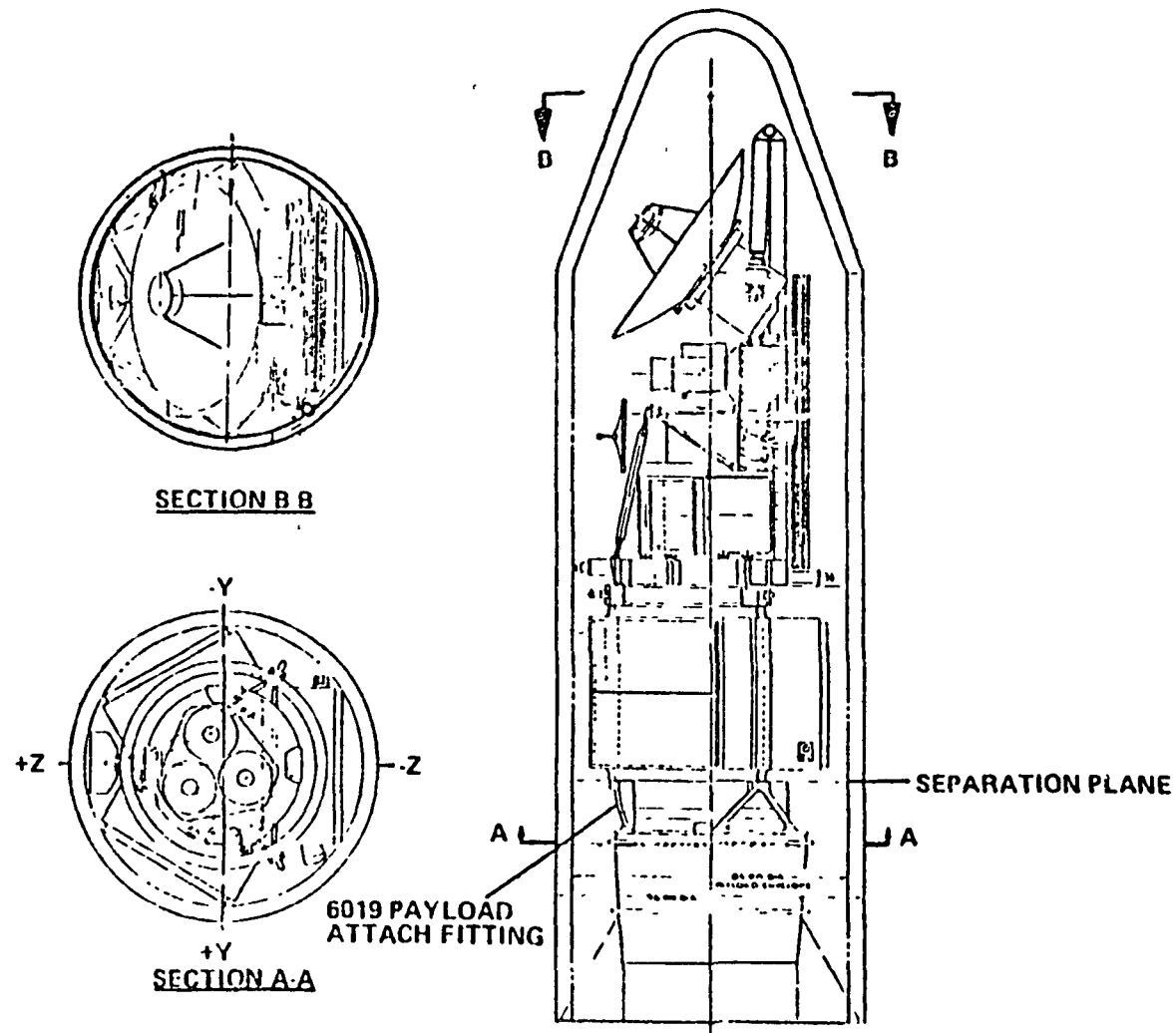


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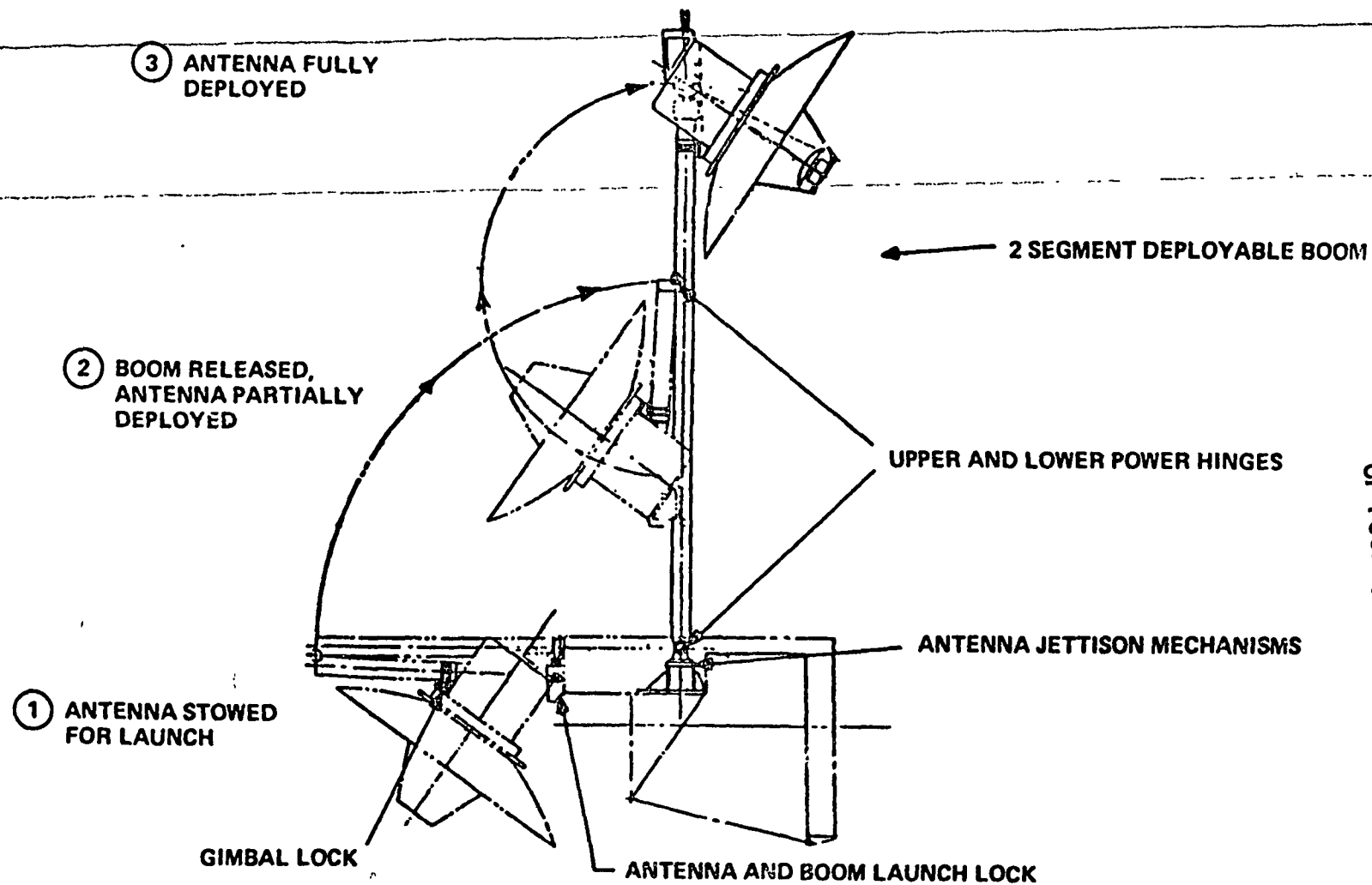


DELTA LAUNCH CONFIGURATION



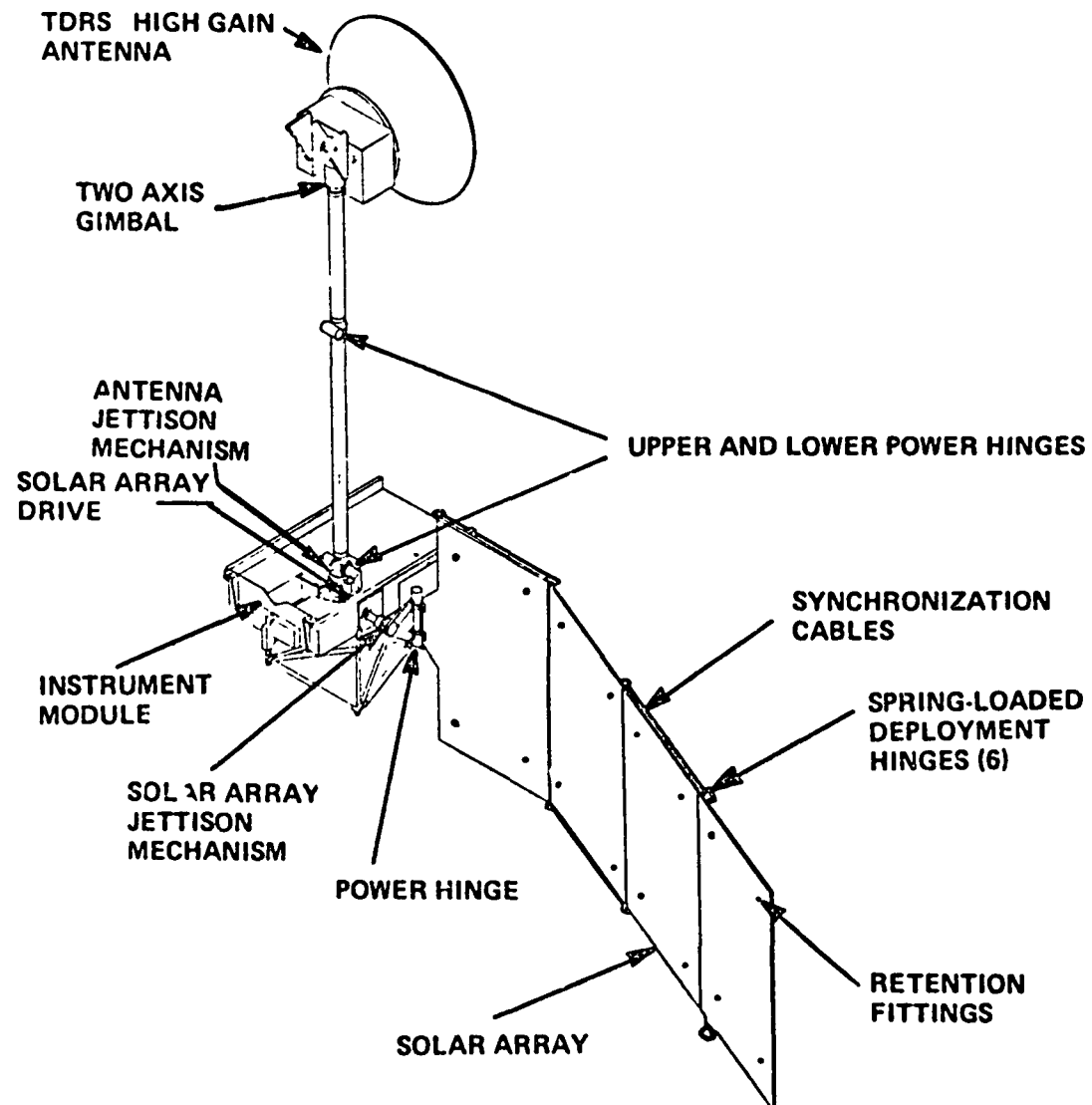
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TDRSS ANTENNA RETENTION AND DEPLOYMENT



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LANDSAT D MECHANISMS

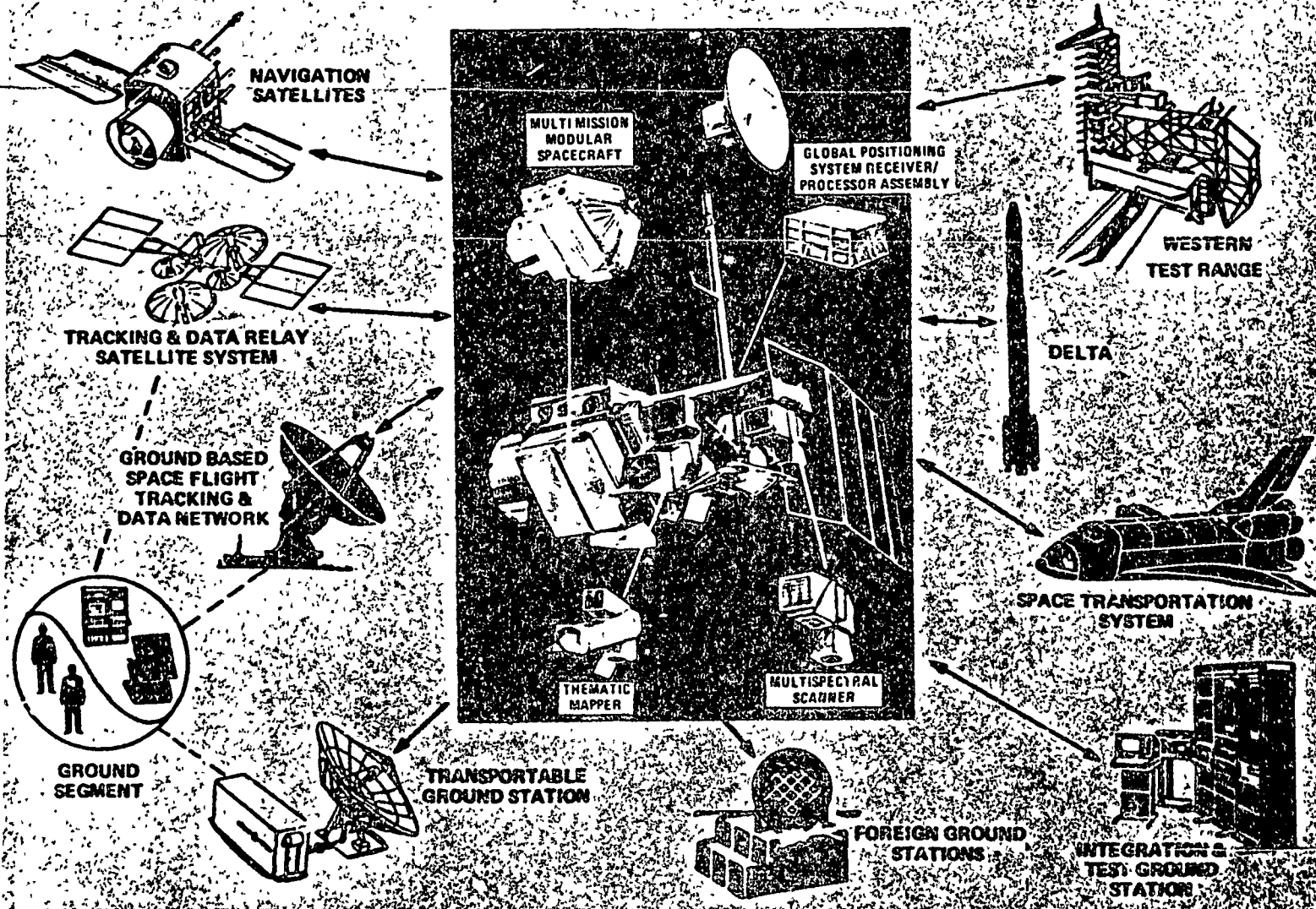


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FLIGHT SEGMENT INTERFACES



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The diagram illustrates the GPS system architecture. At the top left is the **NAVIGATION SATELLITE**. It communicates with the **TRACKING AND DATA RELAY SATELLITE** (top right) via **KSA (TM/MSS)** and **SSA (CMD/TLM)** links. The Navigation Satellite also transmits **L-BAND (GPS)** signals to the ground stations. The Tracking and Data Relay Satellite is connected to the **SSA OR SMA (CMD/TLM)** and **SSA (CMD/TLM)** links. The ground stations include the **NASA GS10N (BACK UP)**, **GOLDSTONE & ALABAMA**, and **GODDARD & FOREIGN GROUND STATIONS**. The ground stations are connected to the Tracking and Data Relay Satellite via **S-BAND (CMD/TLM)**, **S-BAND (TLM)**, **S-BAND (MSS)**, and **X-BAND (TM/MSS)** links. The ground stations also receive **S-BAND (TLM)** signals from the Navigation Satellite.

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FLIGHT SOFTWARE FUNCTIONS

• ATTITUDE CONTROL COMPUTATION

- SENSOR DATA PROCESSING**
- PRECISION ATTITUDE DETERMINATION**
- ACTUATOR COMMAND COMPUTATION**
- MODE SEQUENCING AND INITIALIZATION**

• EPHEMERIDES COMPUTATION

- LANDSAT EPHEMERIS
GROUND UPLINKED OR GPS DATA**
- TDRS POSITIONS: EAST AND WEST SATELLITES**
- SOLAR ORIENTATION**

• TDRS ANTENNA POINTING CONTROL COMPUTATION

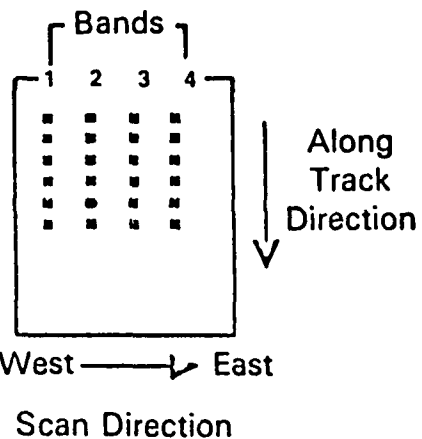
- SLEW MODE**
- PROGRAM TRACK OPEN LOOP WITH SUPERIMPOSED SEARCH PATTERN**
- AUTOTRACK CONTROL CLOSED LOOP COMPUTATIONS**

FLIGHT SOFTWARE FUNCTIONS

- **SOLAR ARRAY ORIENTATION CONTROL COMPUTATION**
 - **COMMAND MODE**
 - **TRACK MODE**
- **TELEMETRY MONITOR**
 - **LIMIT CHECK/COMMAND**
- **GMT CORRECTION**
 - **UPDATE SATELLITE GMT TIME CODE**
- **SOLAR ARRAY DEPLOYMENT SEQUENCING**
 - COMMAND SEQUENCING AND INITIALIZATION**

MULTISPECTRAL SCANNER (MSS) SENSOR

MSS Detector Details



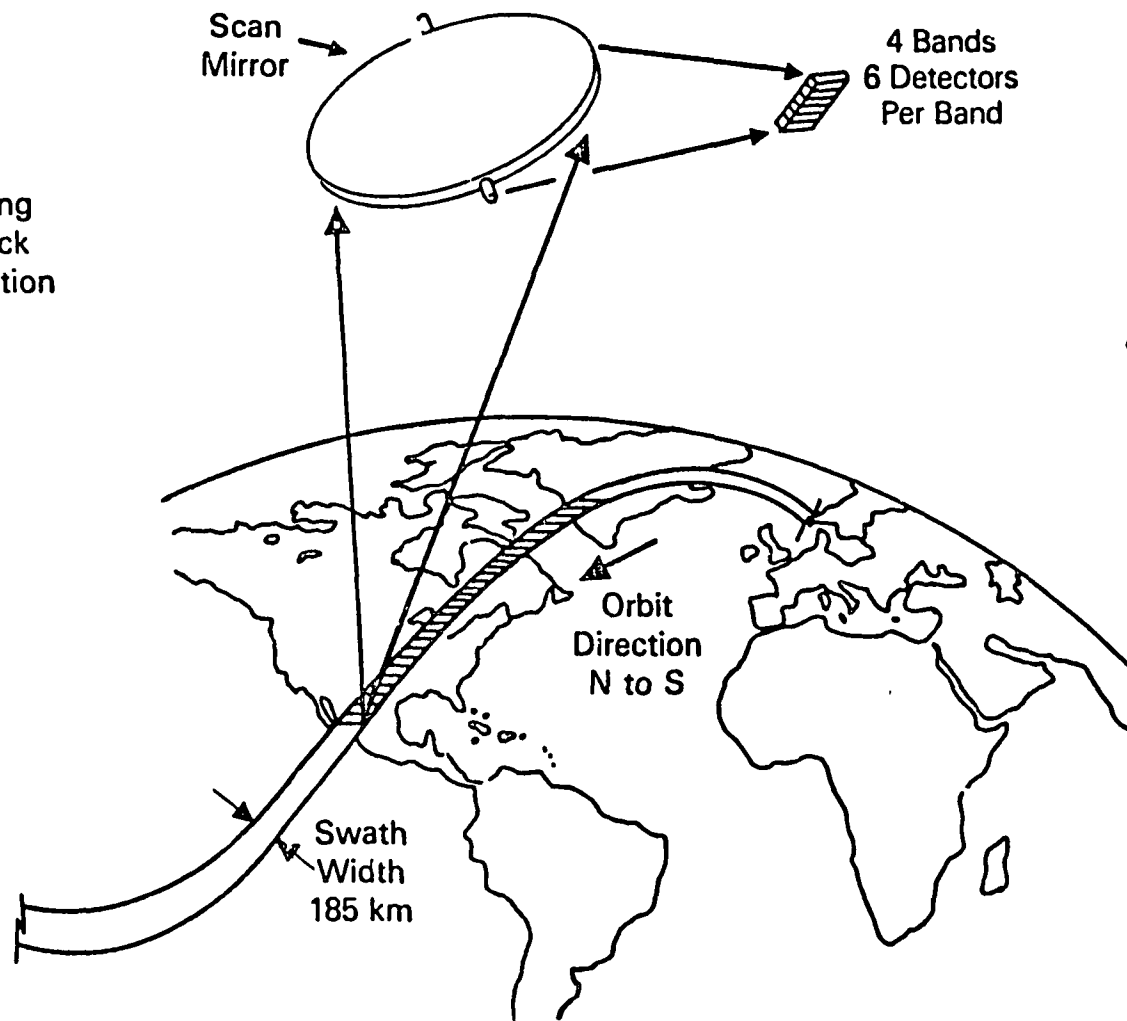
Band	Spectral Ranges μm
1	.5 - .6
2	.6 - .7
3	.7 - .8
4	.8 - 1.1

Ground IFOV

All Bands — 80 Meters

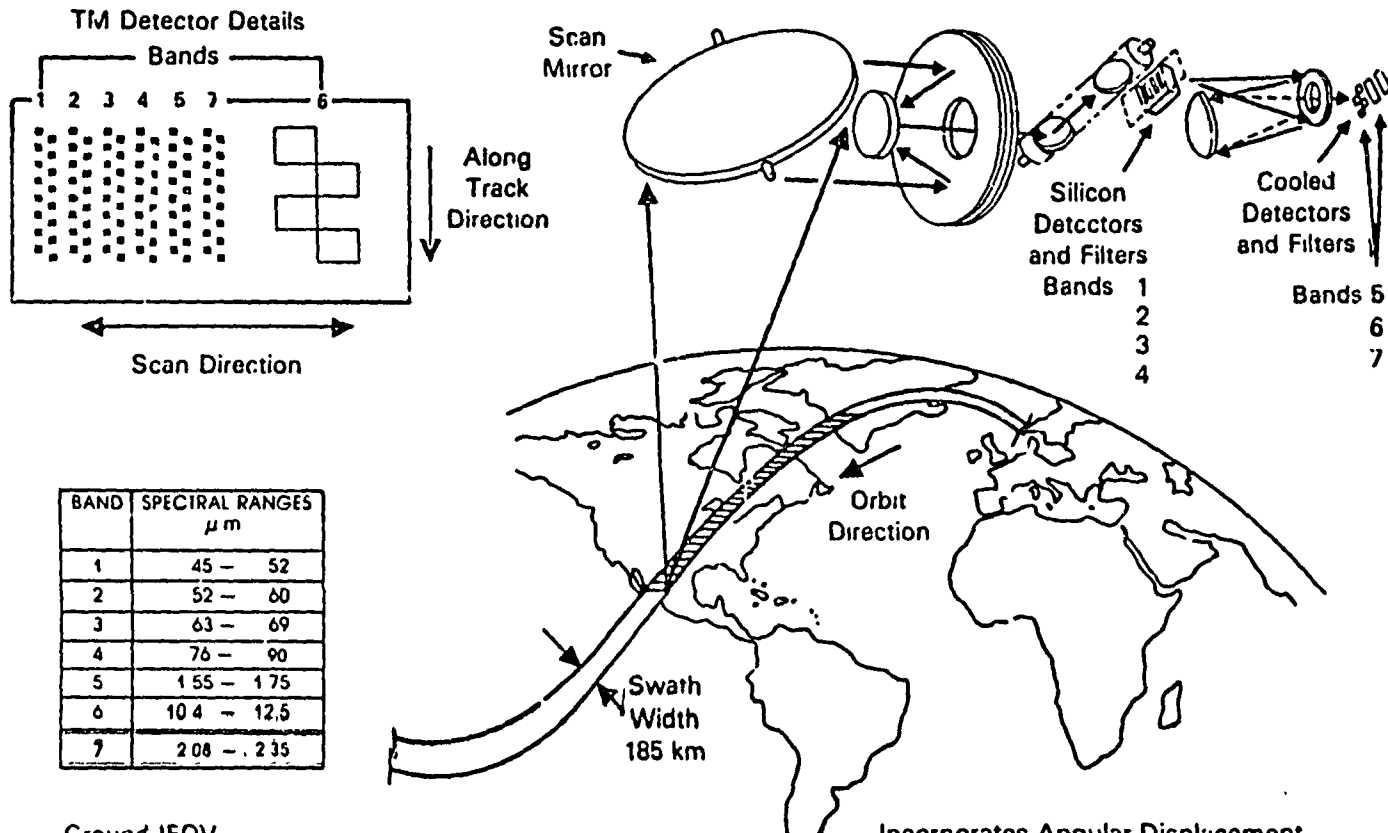
Data Rate — 15.06 Mbps

Quantization Levels — 64



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THEMATIC MAPPER (TM) SENSOR

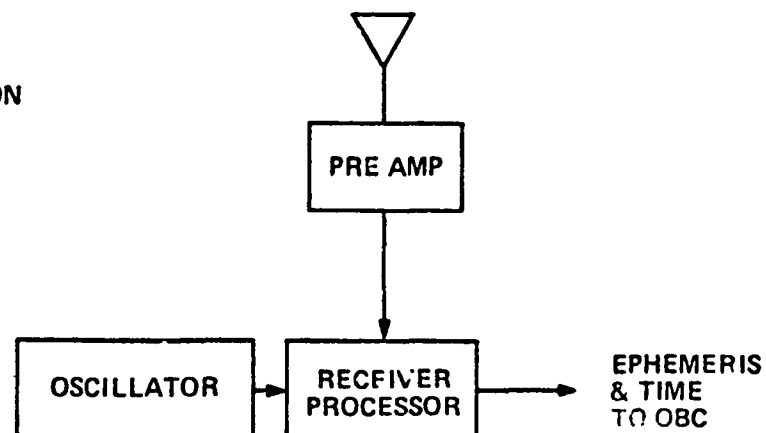
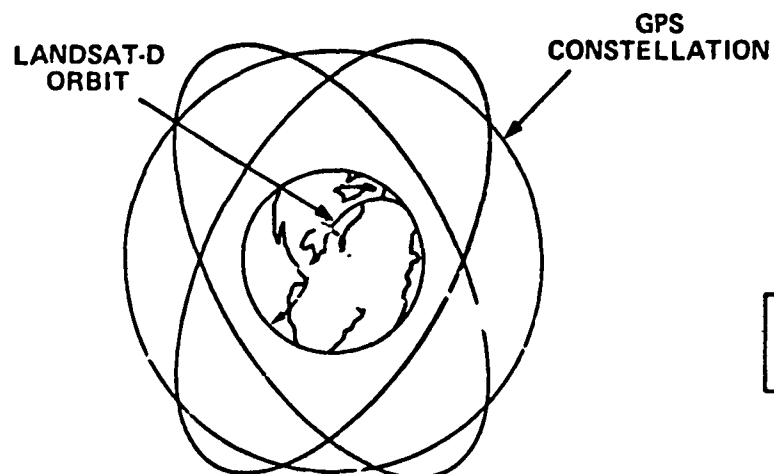


Ground IFOV
 Bands 1-5 & 7 30 Meters
 Band 6 120 Meters
 Data Rate - 84.9 Mbps
 Quantization Levels - 256

Incorporates Angular Displacement Sensor (ADS)
 Measures Angle of Motion from 2 to 125 Hz
 Source of Jitter Compensation Data

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GLOBAL POSITIONING SYSTEM (GPS)



LANDSAT-D GPS OBJECTIVES

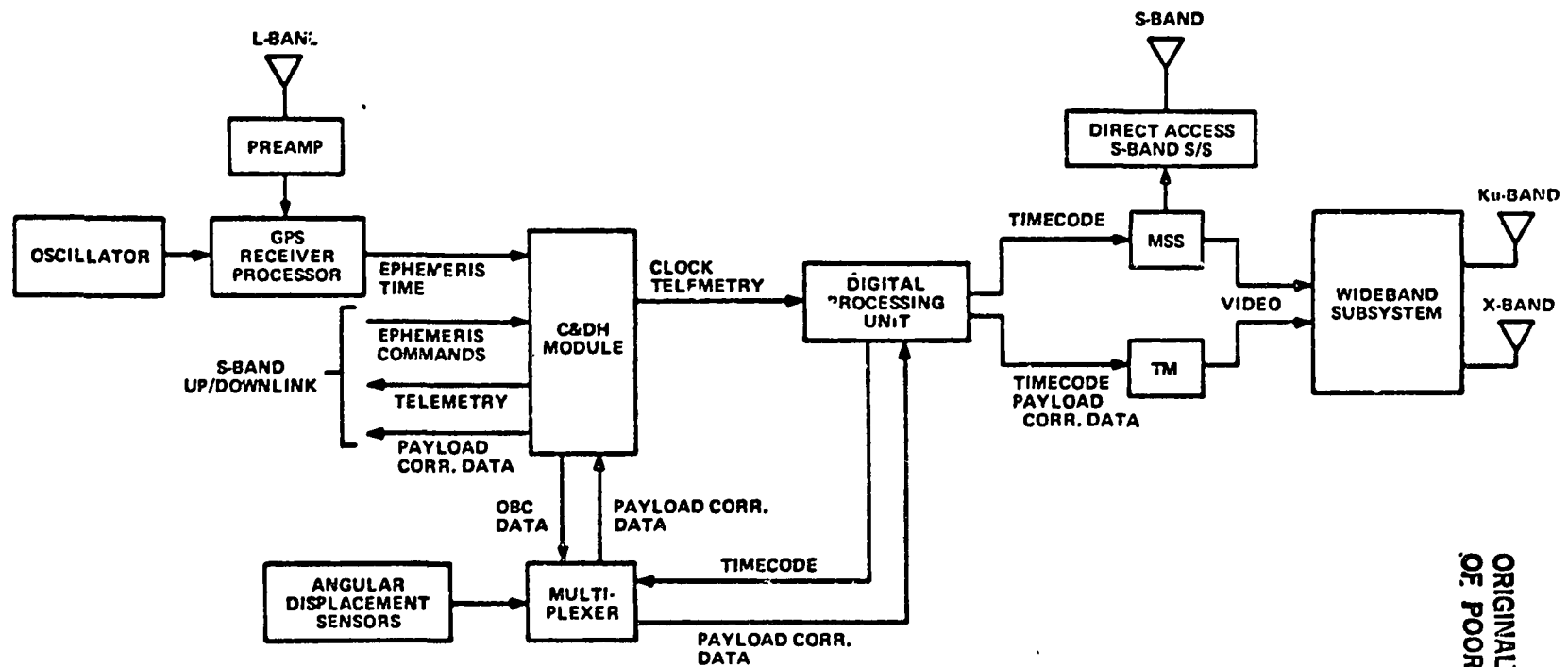
- DEMONSTRATE THAT GPS CAN PROVIDE MORE ACCURATE POSITION-LOCATION DATA THAN GROUND PREDICTED EPHEMERIS
- UTILIZE GPS POSITION-LOCATION DATA ONCE OPERATIONAL PHASE-IN HAS BEEN COMPLETED

ACCURACY

- FIVE SATELLITE CONFIGURATION (TYPICAL FOR LANDSAT-D)
 - 10 TO 150 METERS DEPENDING ON NUMBER OF GPS' IN VIEW
 - ≤ 150 METERS PROPAGATE
- EIGHTEEN SATELLITE CONFIGURATION
 - ≤ 10 METERS

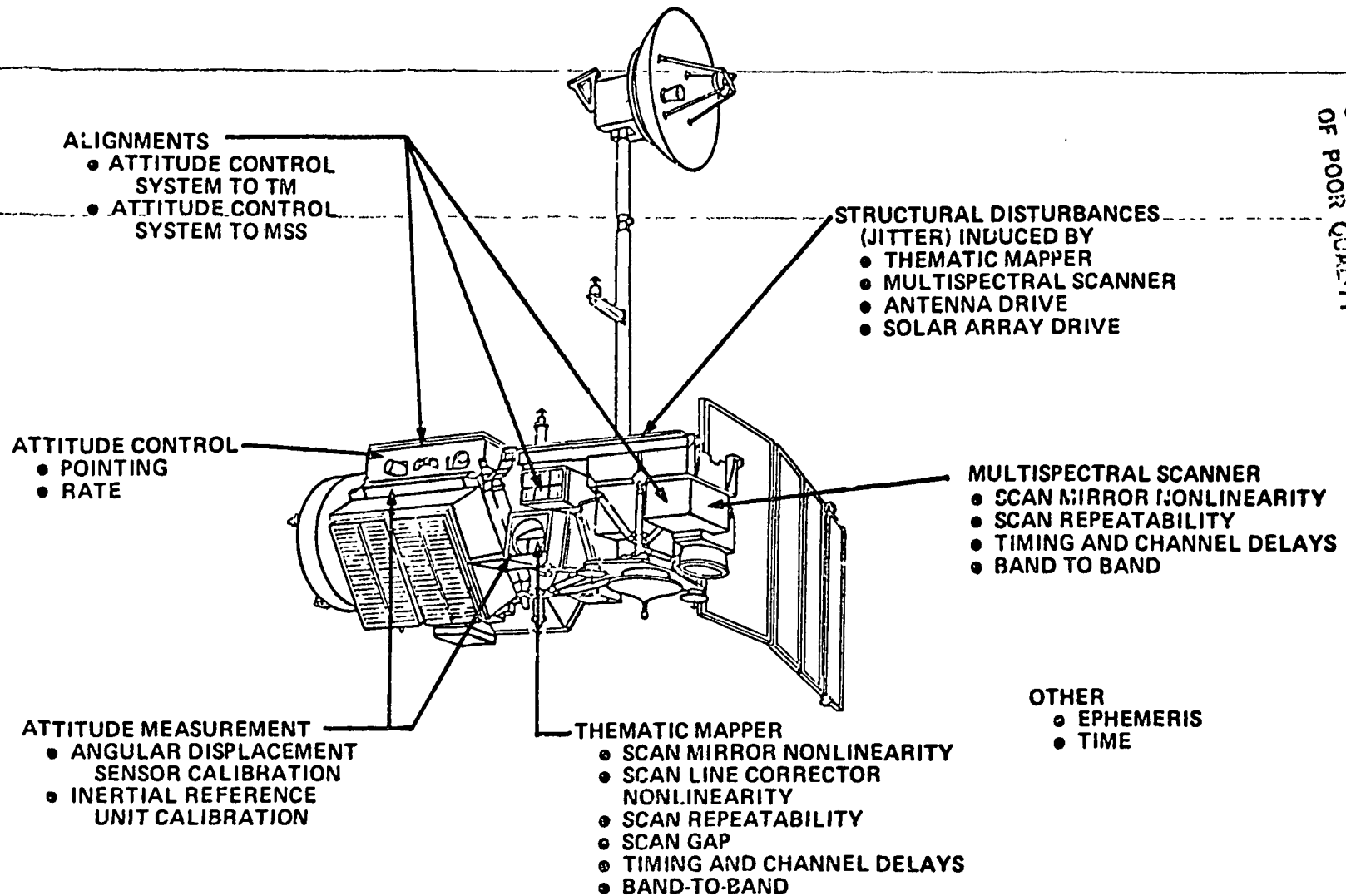
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PRINCIPAL DATA FLOW FLIGHT SEGMENT



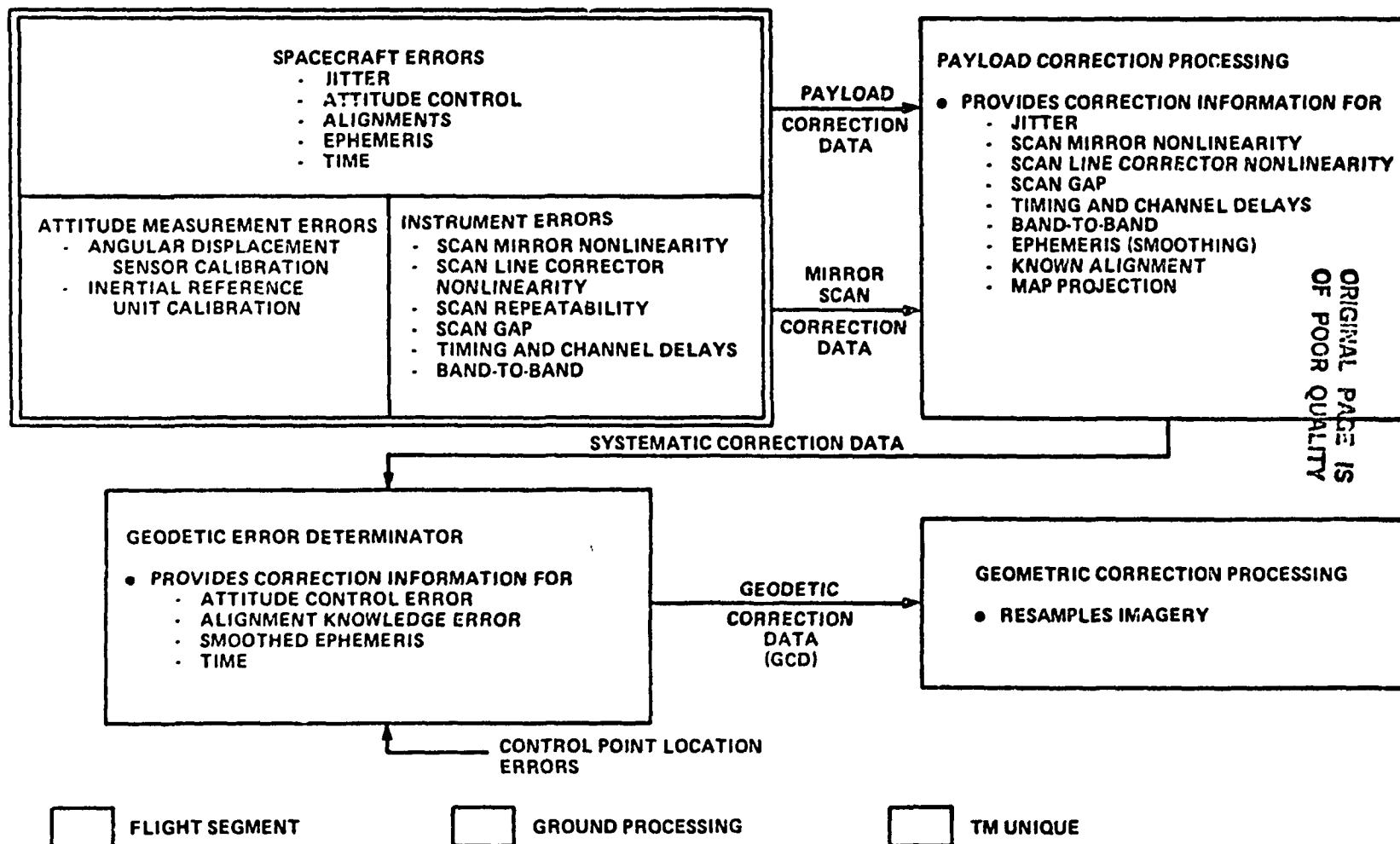
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SOURCES OF GEOMETRIC ERROR FLIGHT SEGMENT



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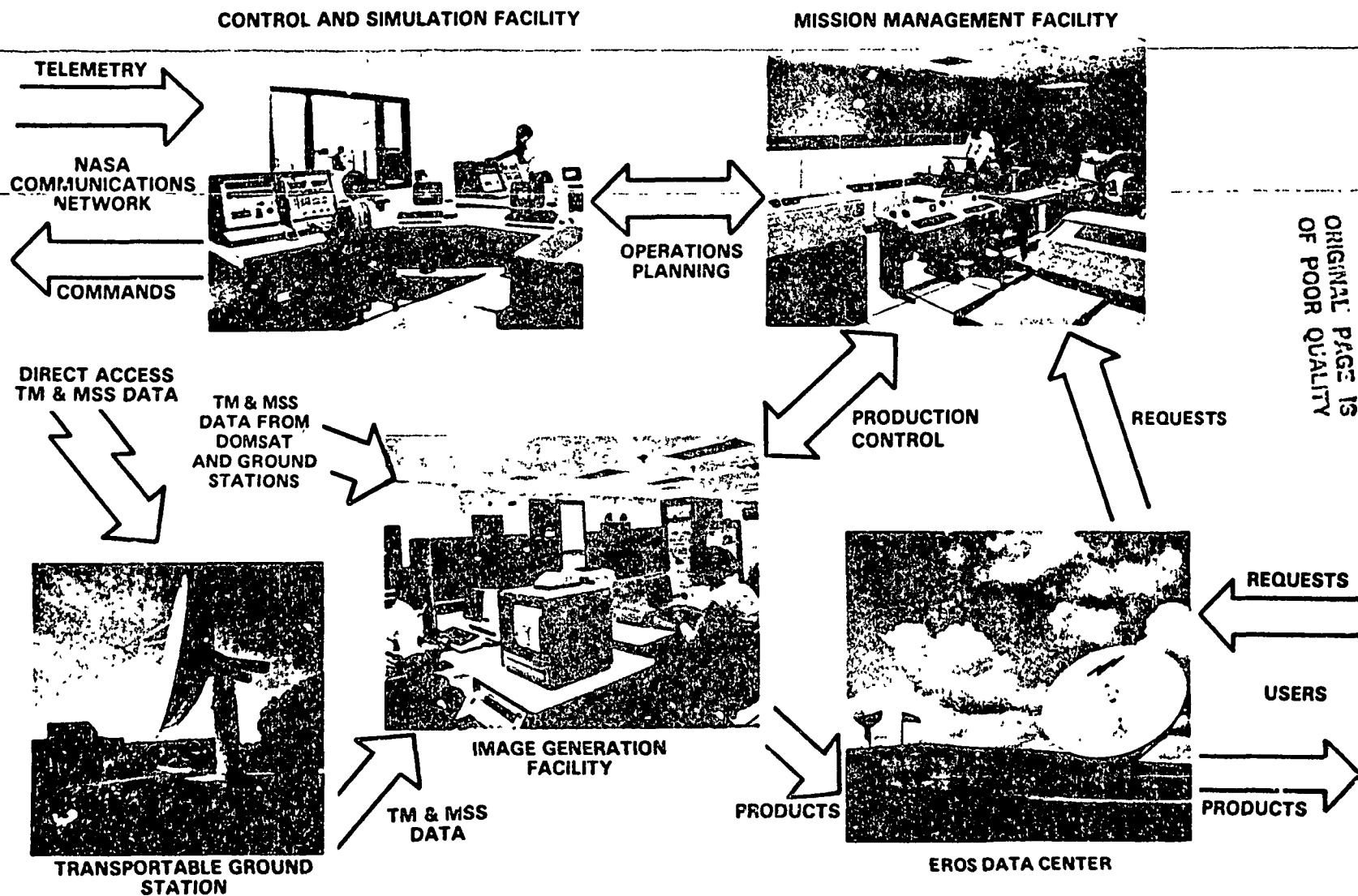
SYSTEM GEOMETRIC ERRORS



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**LANDSAT-D
GROUND SEGMENT**

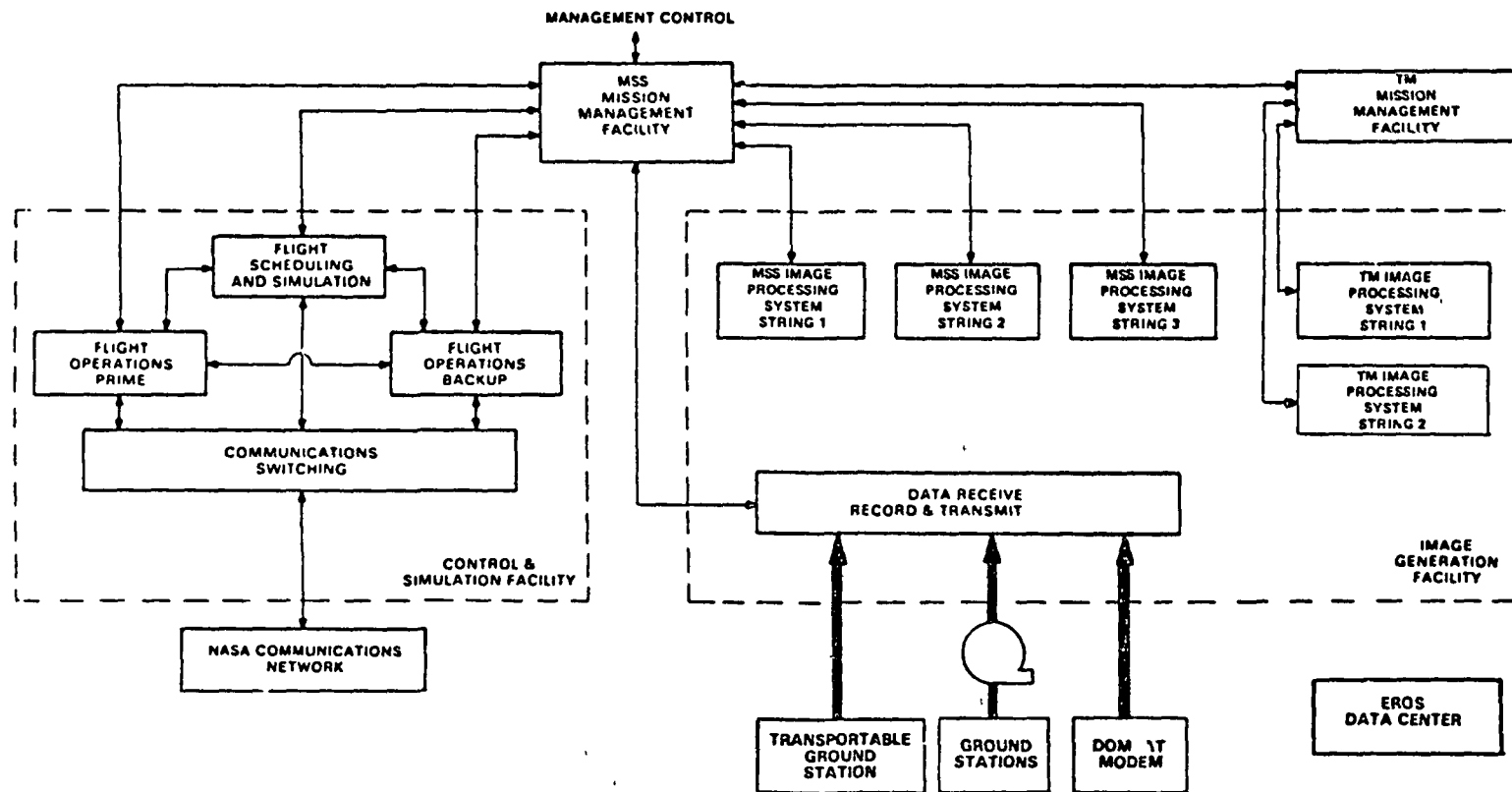
LANDSAT D GROUND SEGMENT



ELEMENTS OF GROUND SEGMENT

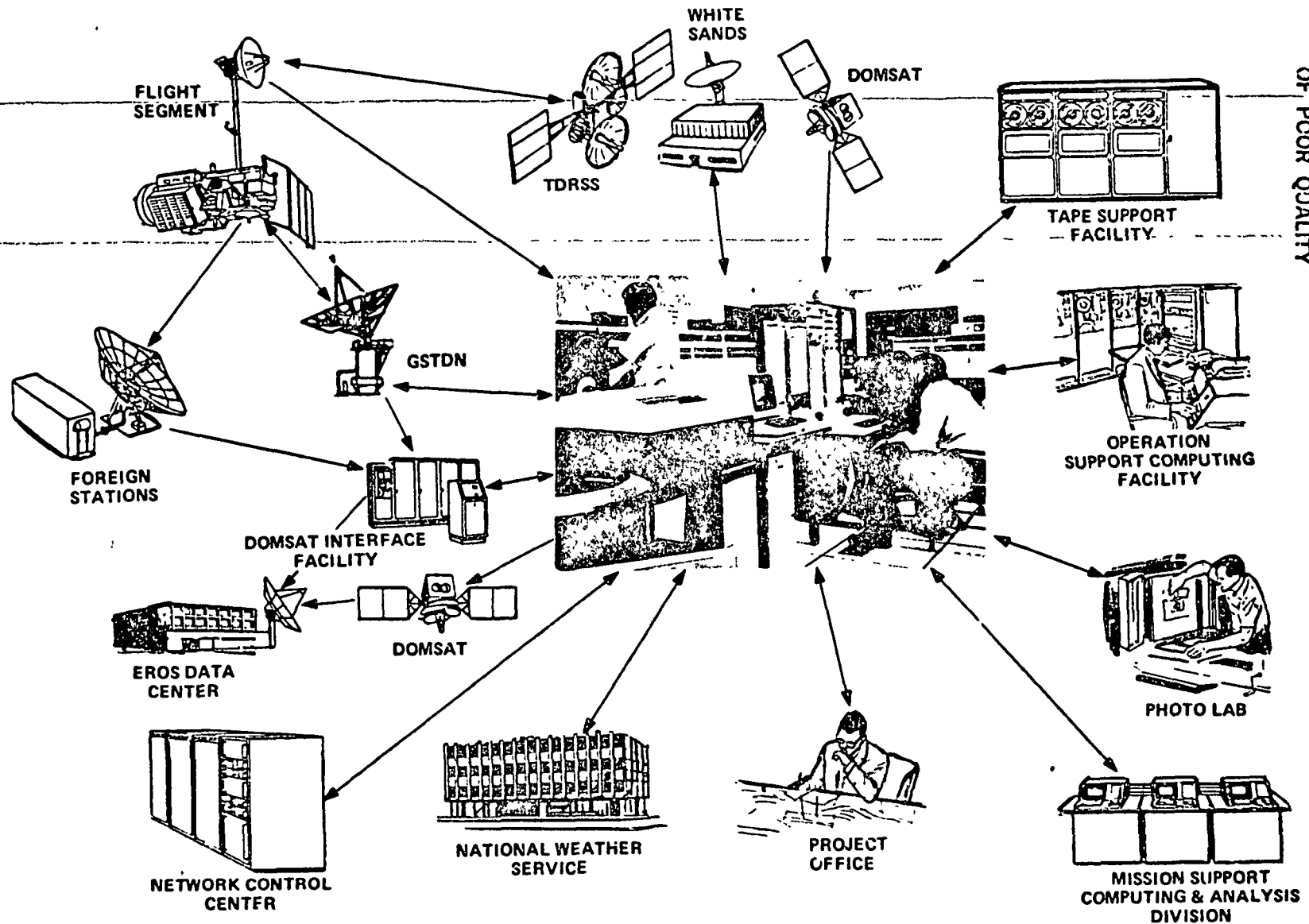
- **MISSION MANAGEMENT FACILITY**
 - **MULTISPECTRAL SCANNER**
 - **THEMATIC MAPPER**
- **CONTROL AND SIMULATION FACILITY**
- **TRANSPORTABLE GROUND STATION**
- **IMAGE GENERATION FACILITY**
 - **DATA RECEIVE, RECORD, TRANSMIT SYSTEM**
 - **MSS IMAGE PROCESSING SYSTEM**
 - **TM IMAGE PROCESSING SYSTEM**
- **EARTH RESOURCES OBSERVATION SYSTEMS DATA CENTER**

LANDSAT-D GROUND SEGMENT



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GROUND SEGMENT INTERFACES



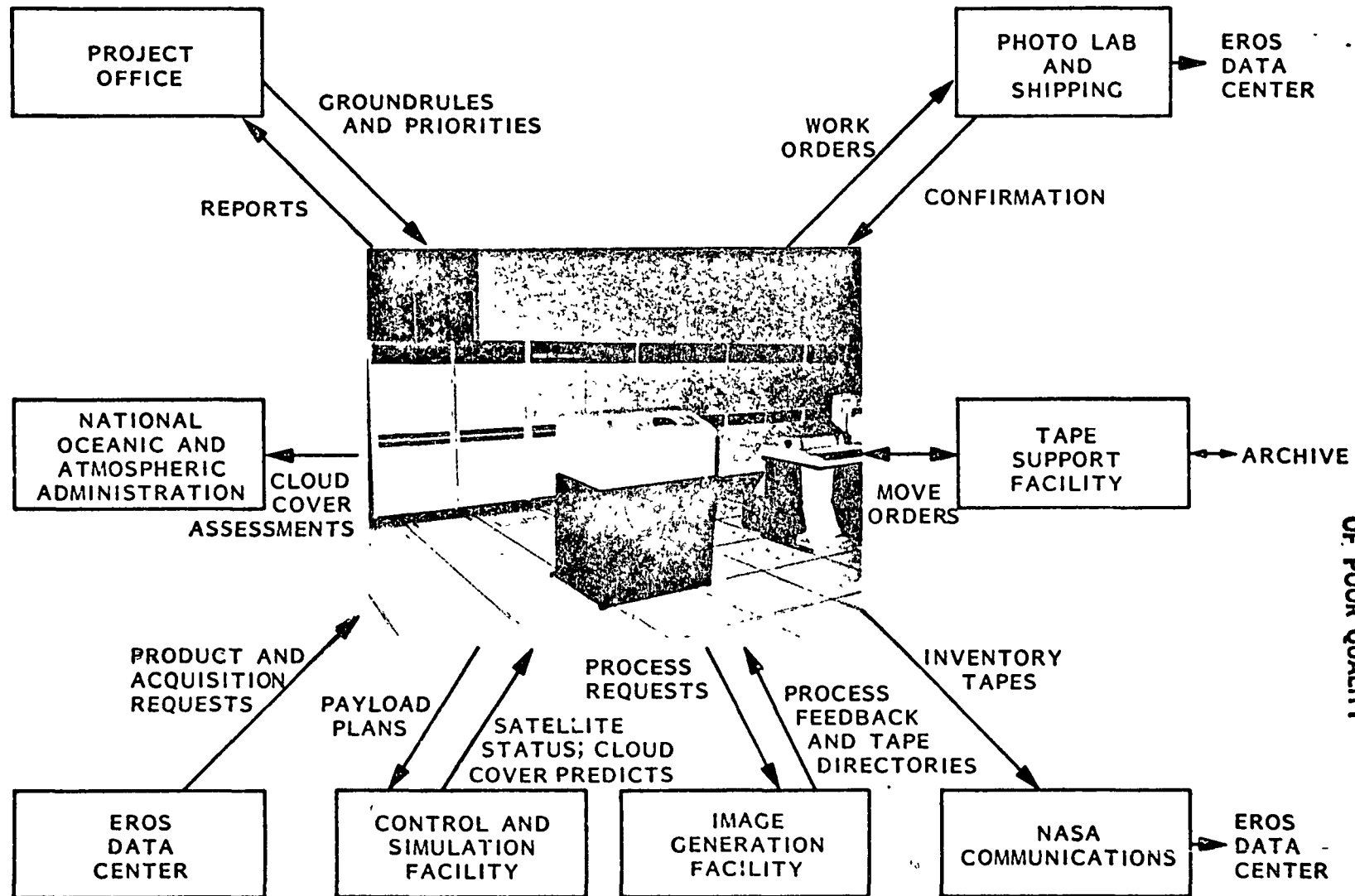
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MISSION MANAGEMENT FACILITY

MAJOR FUNCTIONS

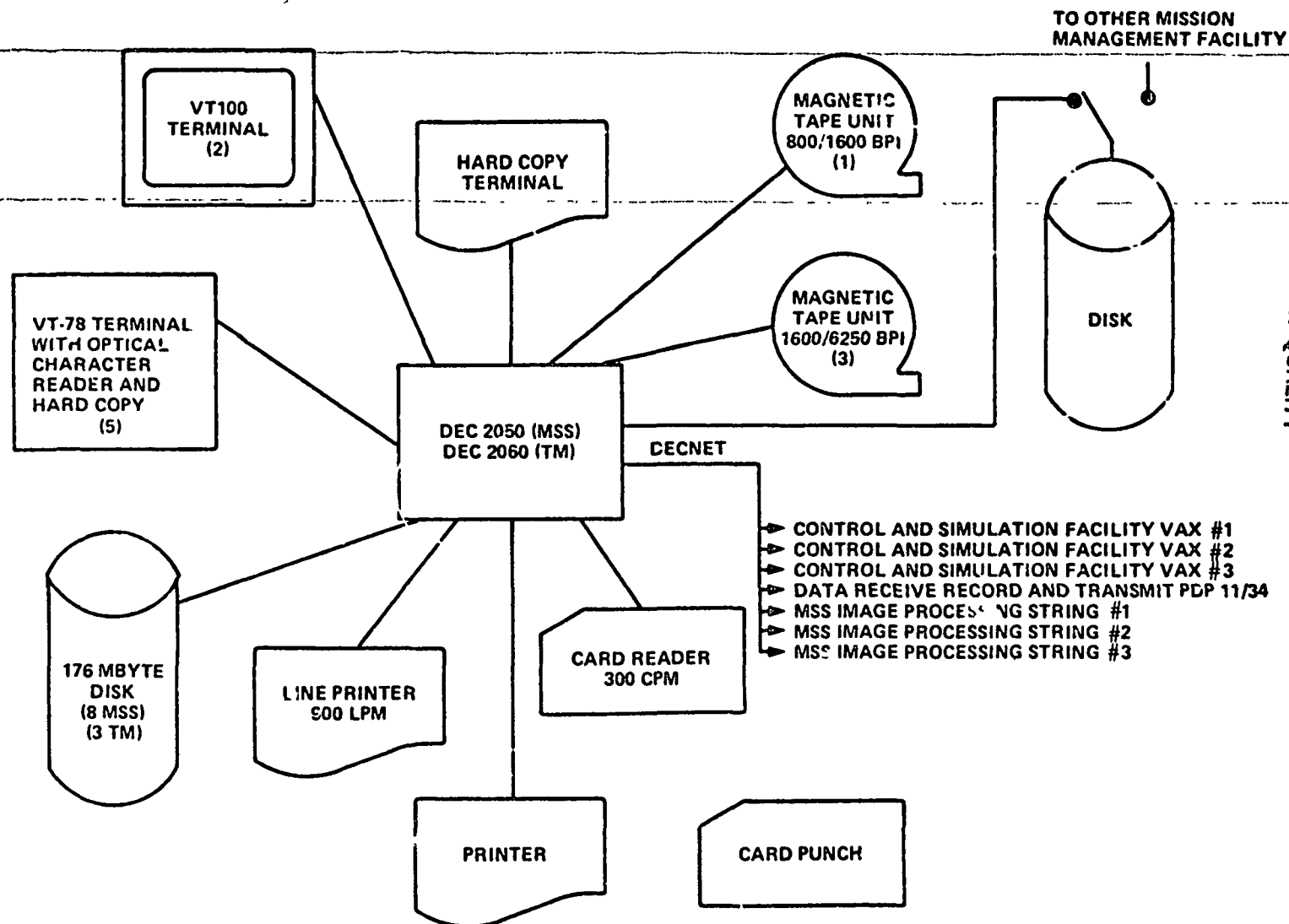
- **PROCESS REQUESTS FOR DATA ACQUISITION**
- **PROVIDE CANDIDATE SCENE DATA ACQUISITION LISTS FOR SATELLITE OPERATIONS PLANNING AND SCHEDULING**
- **ACCOUNT FOR TELEMETRY DATA ACQUISITION**
- **ACCOUNT FOR IMAGE DATA ACQUISITION**
- **SCHEDULE ARCHIVAL PROCESSING**
- **MAINTAIN ARCHIVAL DATA BASE AND PRODUCE IMAGE CATALOGS**
- **PROCESS REQUESTS FOR PRODUCT GENERATION**
- **SCHEDULE PRODUCT GENERATION**
- **MAINTAIN GROUND SEGMENT SUPPLIES INVENTORY**
- **TRACK GROUND SEGMENT PROBLEMS**
- **PROVIDE VERIFICATION AND SELF TEST CAPABILITY**
- **PROVIDE MANAGEMENT REPORTS**

MISSION MANAGEMENT FACILITY INTERFACES



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MISSION MANAGEMENT FACILITY (MSS OR TM) HARDWARE

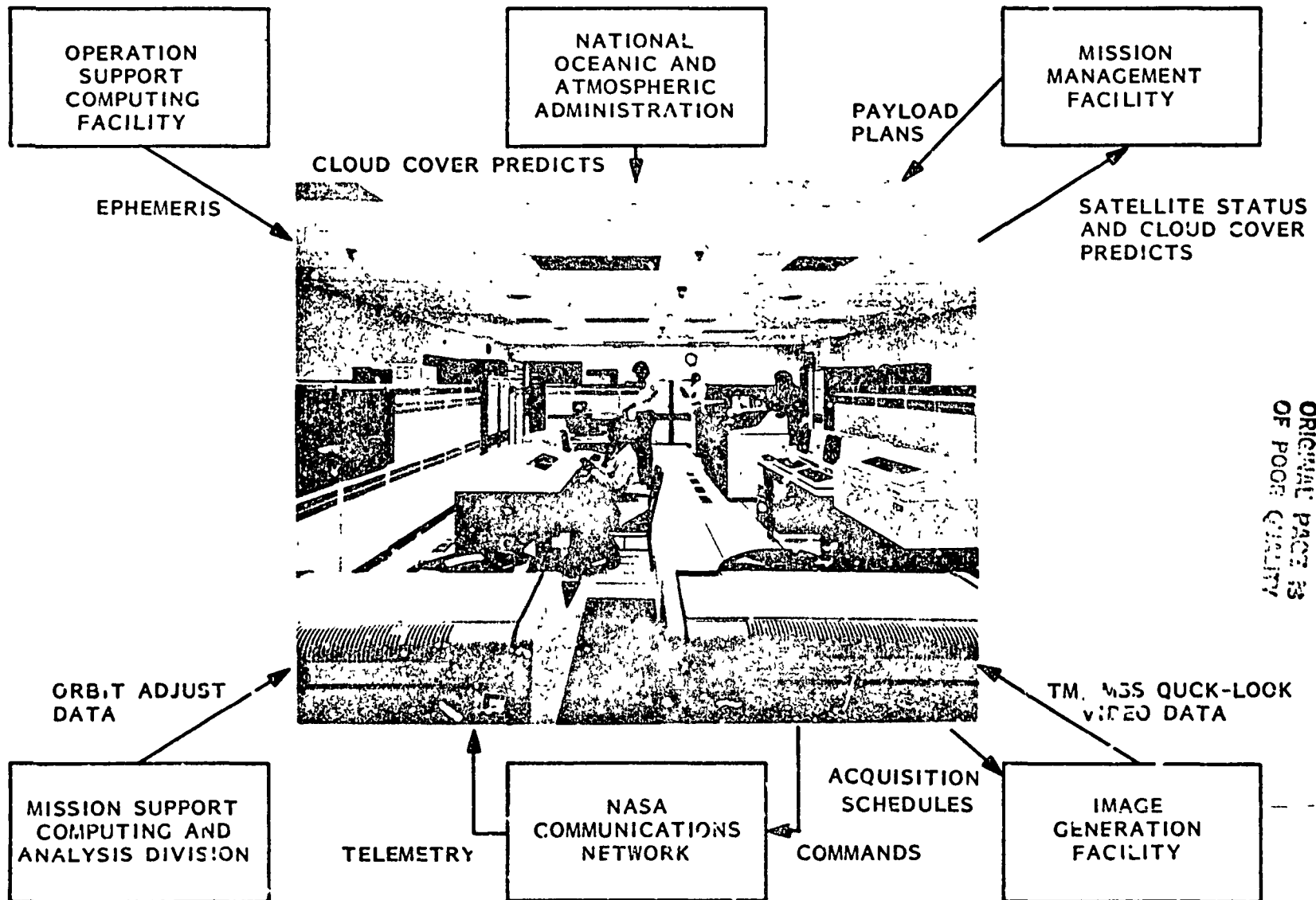


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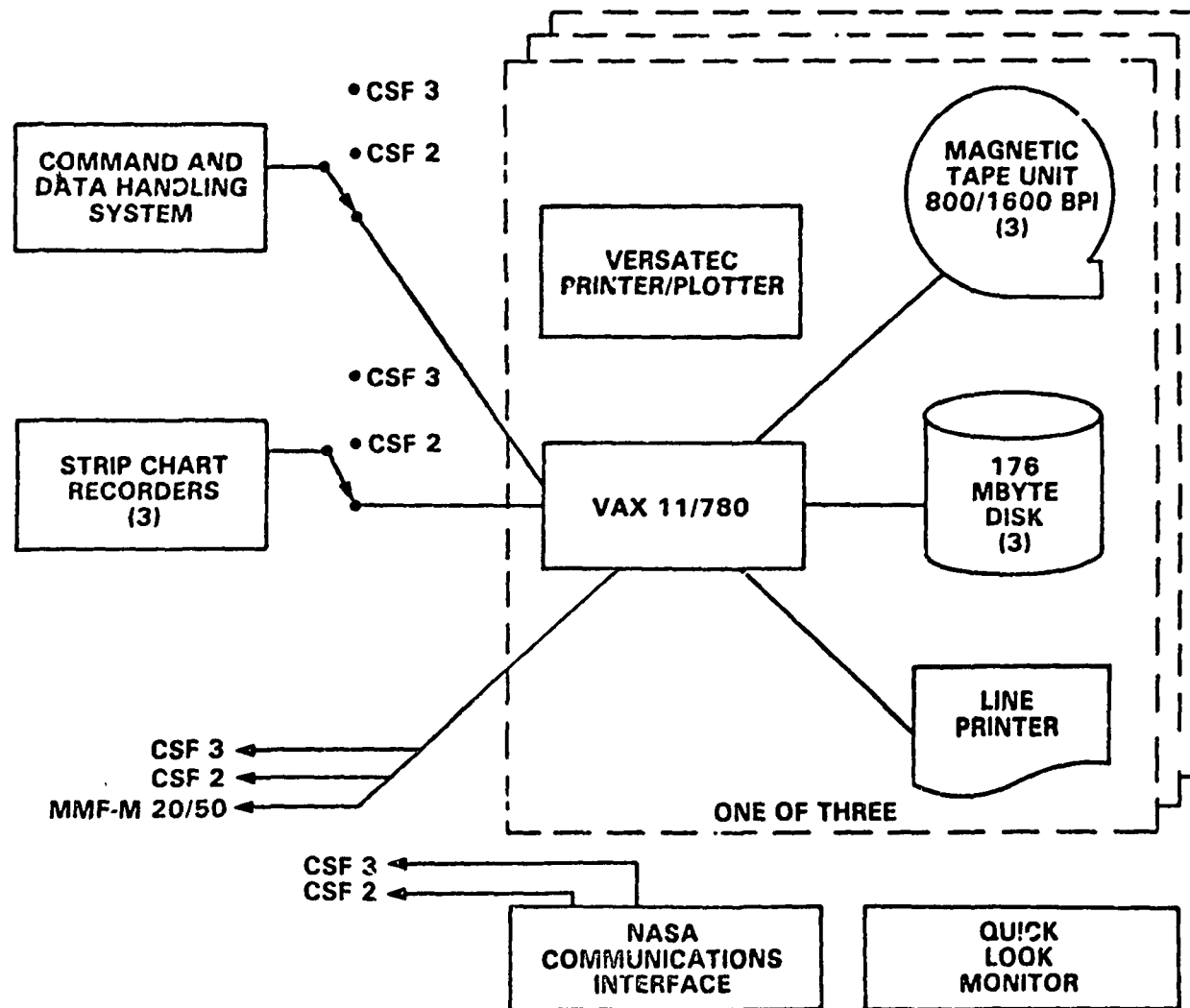
CONTROL AND SIMULATION FACILITY MAJOR FUNCTIONS

- **PLAN AND SCHEDULE FLIGHT SEGMENT OPERATIONS**
- **SCHEDULE LINK SUPPORT WITH NETWORK CONTROL CENTER**
- **COMMAND FLIGHT SEGMENT**
- **ACQUIRE FLIGHT SEGMENT TELEMETRY**
- **MONITOR, EVALUATE, AND REPORT FLIGHT SEGMENT PERFORMANCE**
- **SIMULATE FLIGHT SEGMENT OPERATION**
- **REPROGRAM ON BOARD COMPUTER**
- **PERFORM SELF TEST**

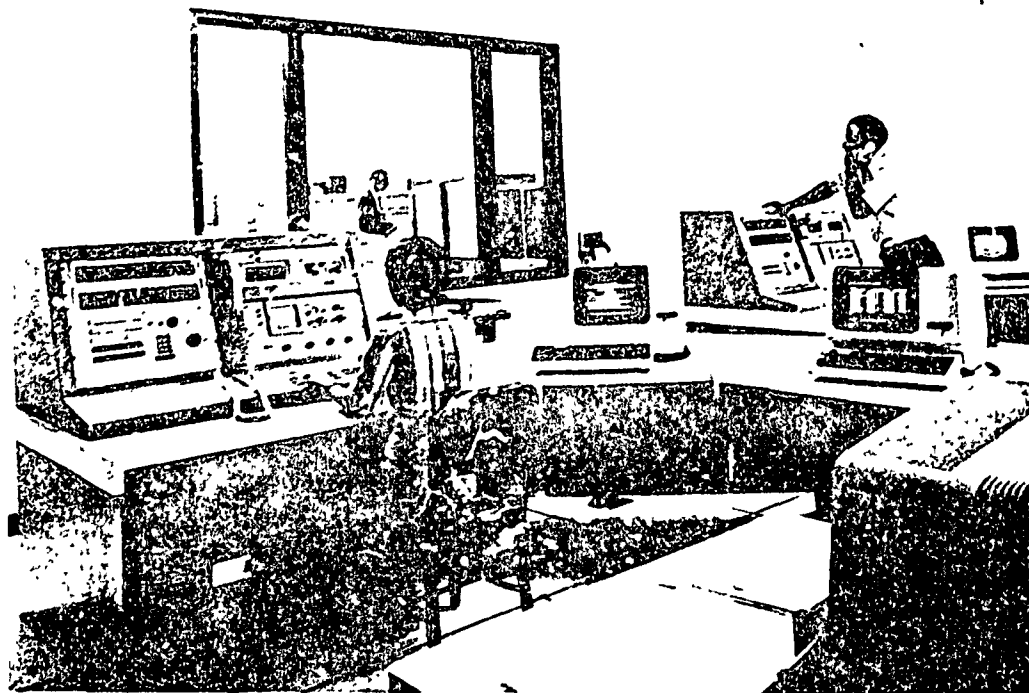
CONTROL AND SIMULATION FACILITY INTERFACES



CONTROL AND SIMULATION FACILITY HARDWARE

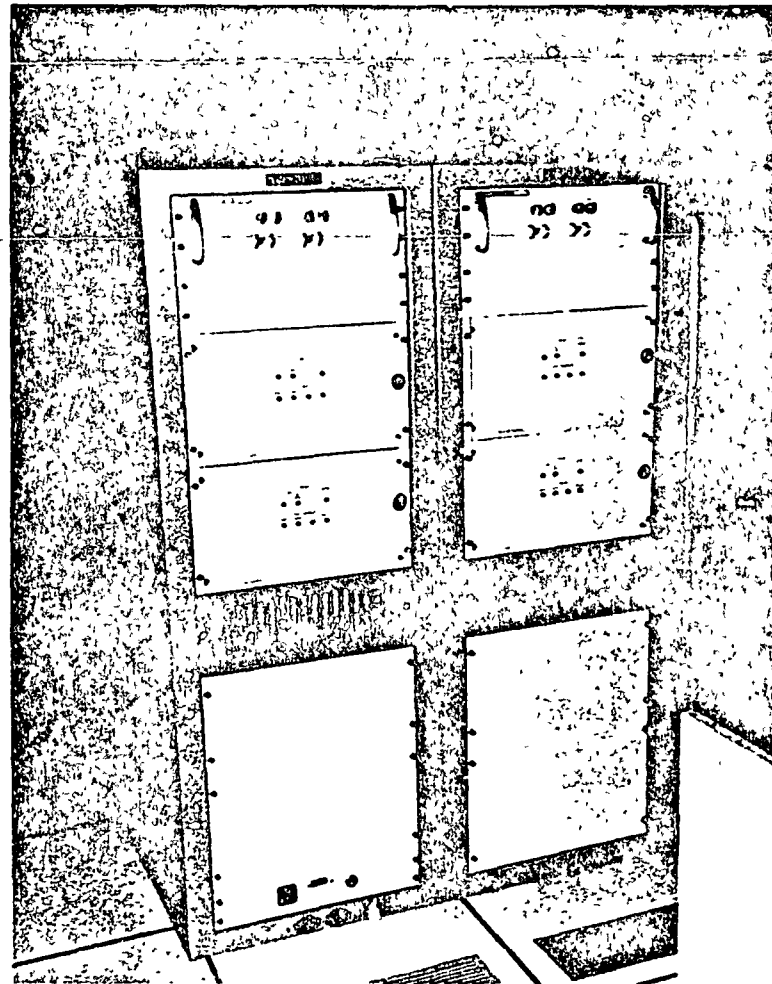


CSF CONTROL ROOM



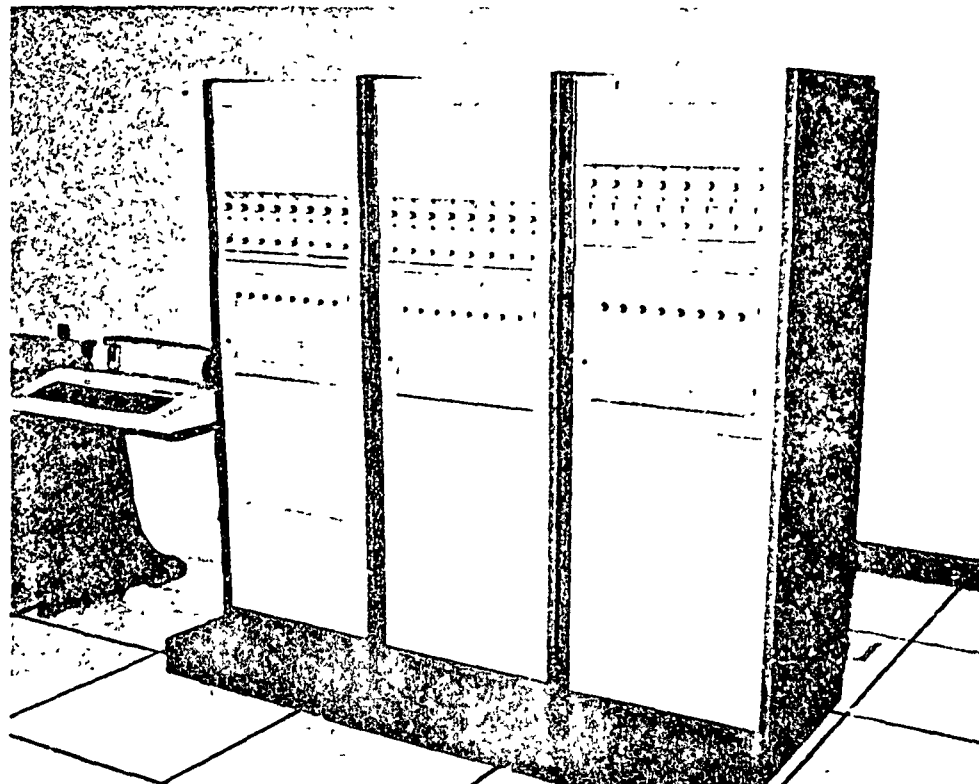
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NASCOM INTERFACE

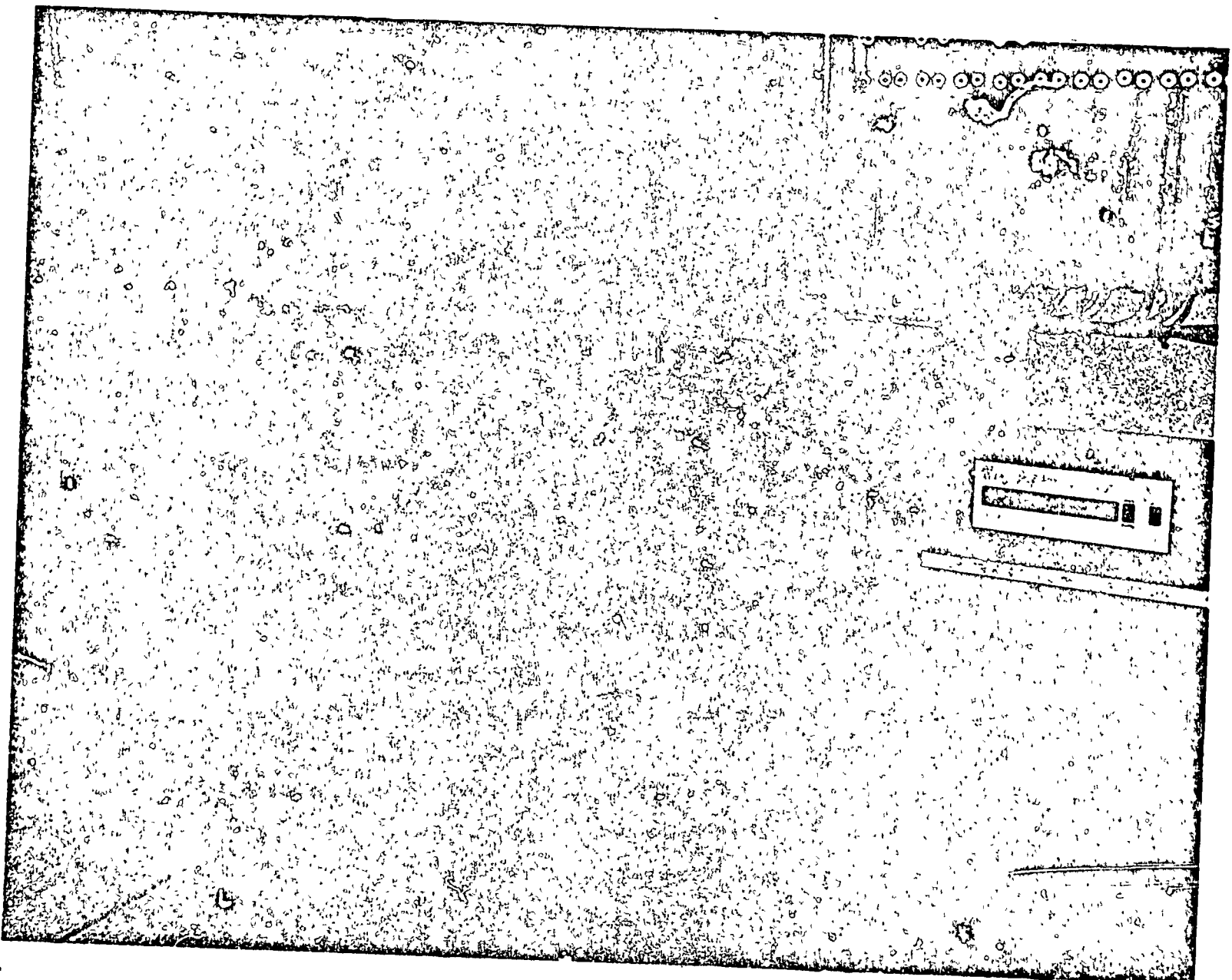


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CSF STRIP CHART RECORDERS



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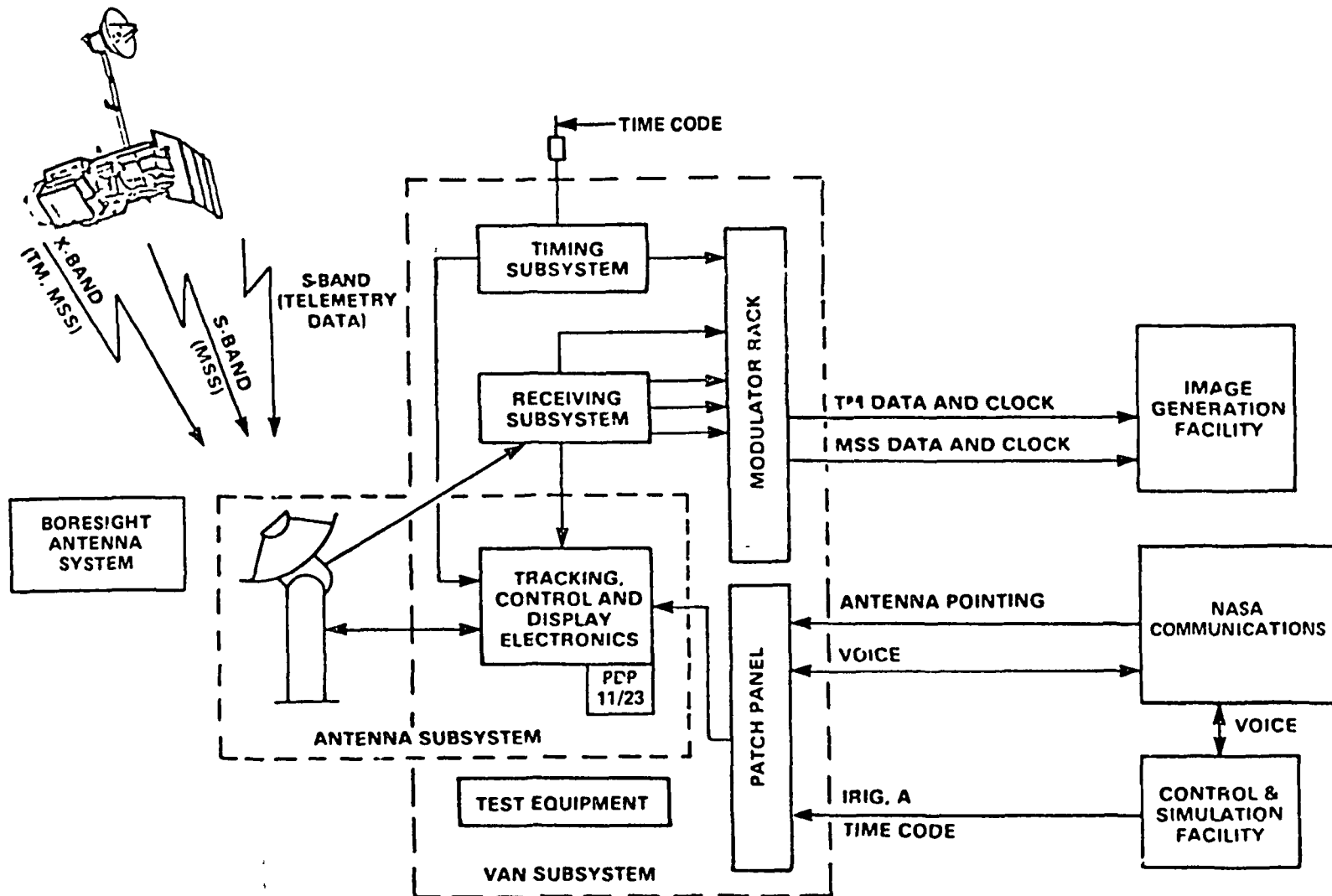


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TRANSPORTABLE GROUND SYSTEM MAJOR FUNCTIONS

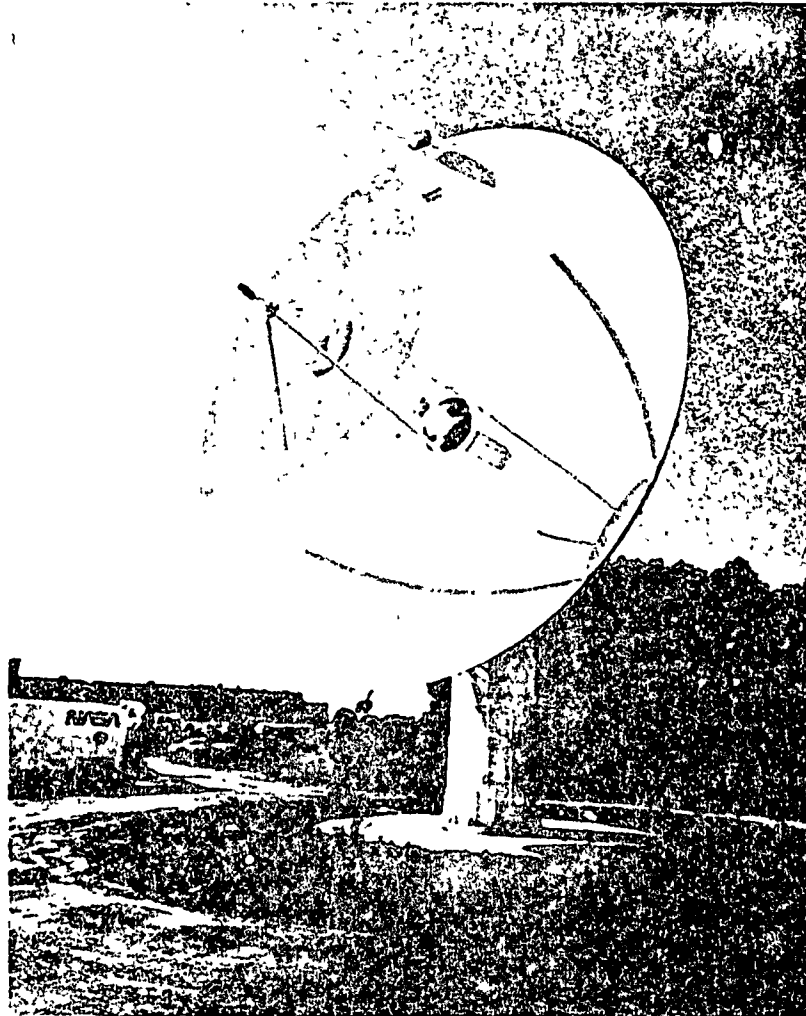
- **ACQUIRE TM/MSS VIDEO DATA**
 - **OPERATIONALLY IN PRE-TDRSS ERA**
 - **SUPPORT EVALUATION IN POST-TDRSS ERA**
- **PROVIDE TM/MSS VIDEO DATA TO THE IMAGE GENERATION FACILITY**
- **PROVIDE CAPABILITY TO RECEIVE NARROWBAND TELEMETRY**

TRANSPORTABLE GROUND STATION



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TRANSPORTABLE GROUND STATION



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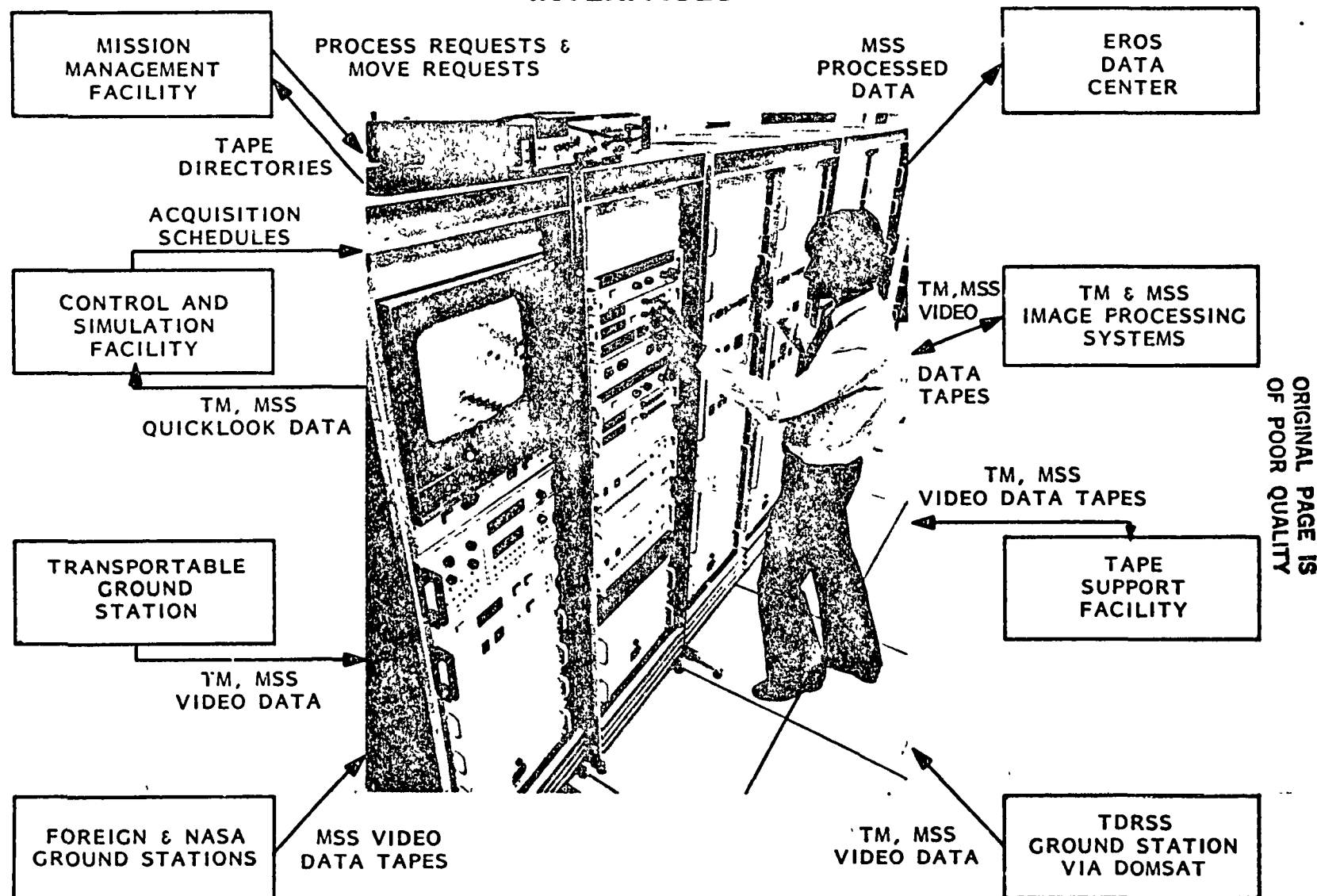
IMAGE GENERATION FACILITY

- **DATA RECEIVE, RECORD TRANSMIT SYSTEM**
- **MSS IMAGE PROCESSING SYSTEM**
- **TM IMAGE PROCESSING SYSTEM**

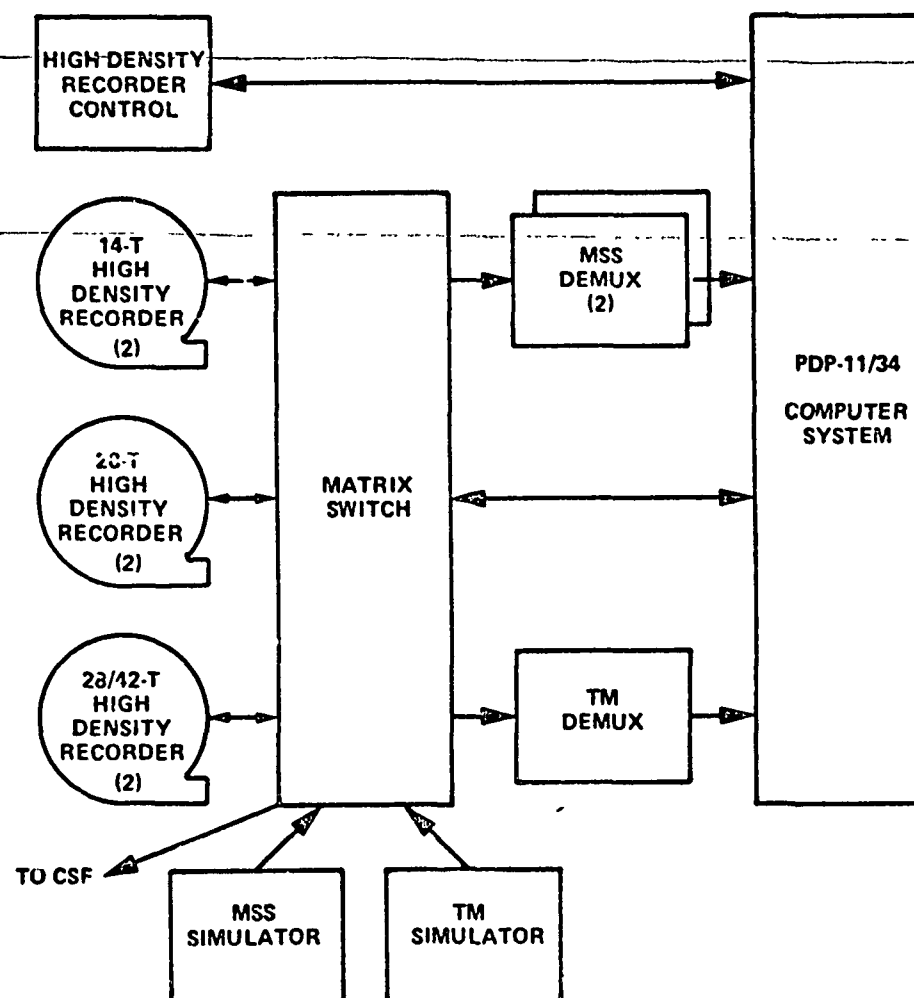
DATA RECEIVE, RECORD, TRANSMIT SYSTEM MAJOR FUNCTIONS

- **RECORD MSS AND TM DATA**
- **GENERATE TAPE DIRECTORIES**
- **COPY HIGH DENSITY TAPES**
- **ARCHIVE HIGH DENSITY TAPES**
- **TRANSMIT MSS DATA TO EROS DATA CENTER**

DATA RECEIVE, RECORD, TRANSMIT SYSTEM INTERFACES



DATA RECEIVE, RECORD, TRANSMIT SYSTEM HARDWARE



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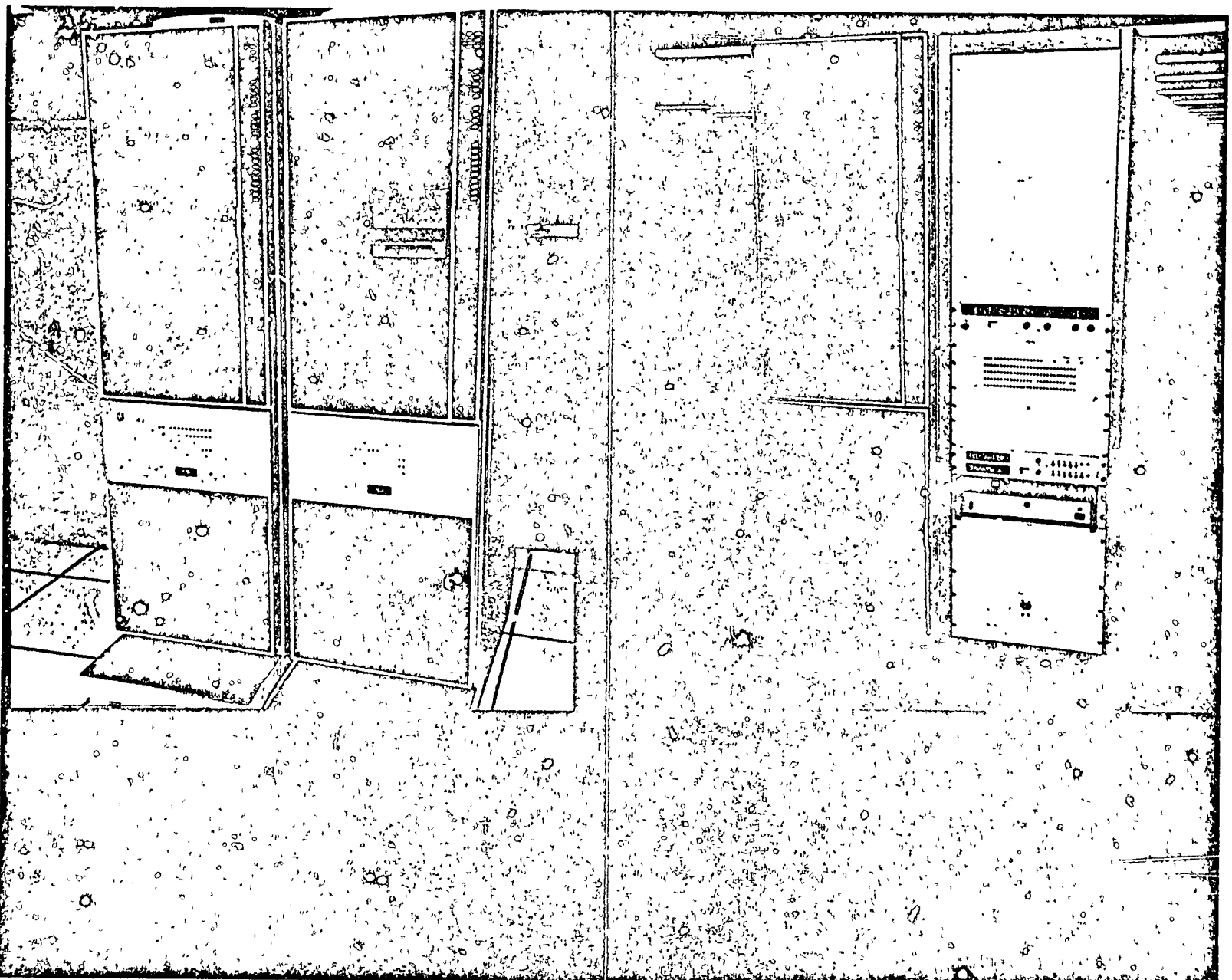


IMAGE GENERATION MAJOR PERFORMANCE REQUIREMENTS

REQUIREMENT	MSS PROCESSING SYSTEM JULY 31, 1982	TM R&D SYSTEM JULY 31, 1983	TM PROCESSING SYSTEM JANUARY 31, 1985
TURNAROUND TIME	48 HOURS MAXIMUM • RAW DATA TO ARCHIVAL HIGH DENSITY TAPE • WITH ANY SINGLE POINT FAILURE	48 HOURS MAXIMUM • RAW DATA TO - PRODUCT HIGH DENSITY TAPE - PRODUCT FILM - CCT	48 HOURS MAXIMUM • RAW DATA TO - PRODUCT HIGH DENSITY TAPE - PRODUCT FILM - CCT
MAXIMUM UTILIZATION	85% OF 16 HOUR DAY	85% OF 8 HOUR DAY	85% OF 24 HOUR DAY
RADIOMETRIC ACCURACY	± 1 QUANTUM LEVEL	± 1 QUANTUM LEVEL	± 1 QUANTUM LEVEL
MAP PROJECTIONS	SPACE OBLIQUE MERCATOR UNIVERSAL TRANSVERSE MERCATOR/POLAR STEREOGRAPHIC	SPACE OBLIQUE MERCATOR UNIVERSAL TRANSVERSE MERCATOR/POLAR STEREOGRAPHIC	SPACE OBLIQUE MERCATOR UNIVERSAL TRANSVERSE MERCATOR/POLAR STEREOGRAPHIC
RESAMPLING ALGORITHMS	CUBIC CONVOLUTION NEAREST NEIGHBOR	CUBIC CONVOLUTION NEAREST NEIGHBOR	CUBIC CONVOLUTION NEAREST NEIGHBOR
GEOMETRIC ACCURACY*			
• TEMPORAL REGISTRATION	0.3 PIXEL (90% OF THE TIME)	0.3 PIXEL ** (90% OF THE TIME)	0.3 PIXEL (90% OF THE TIME)
• GEODETIC	0.5 PIXEL (90% OF THE TIME)	0.5 PIXEL ** (90% OF THE TIME) ** WITH APRIORI JITTER CORRECTION	0.5 PIXEL (90% OF THE TIME)

* WITH SUFFICIENT CORRECTABLE GROUND CONTROL POINTS

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MSS IMAGE PROCESSING SYSTEM MAJOR FUNCTIONS

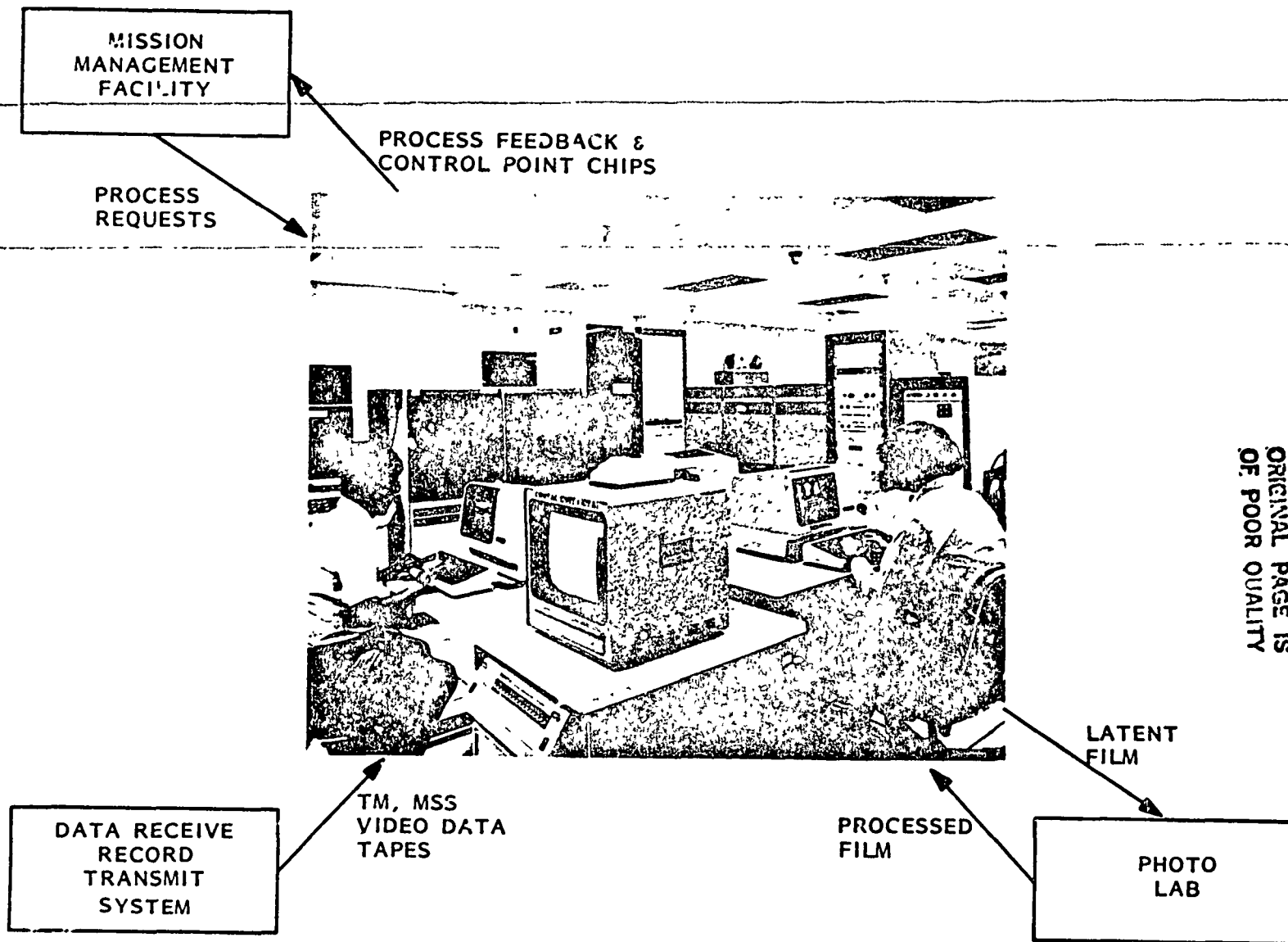
- **PROCESS IMAGE RELATED TELEMETRY
(ATTITUDE AND EPHEMERIS)**
- **GENERATE 28-TRACK ARCHIVAL TAPES**
 - **RADIOMETRICALLY CORRECTED**
 - **GEOMETRIC CORRECTIONS APPENDED**
- **CREATE QUALITY ASSURANCE PRODUCTS**
 - **COMPUTER COMPATIBLE TAPES**
 - **REPORTS**
 - **FULLY CORRECTED HIGH RESOLUTION FILM**

PRODUCTION REQUIREMENTS MSS DATA

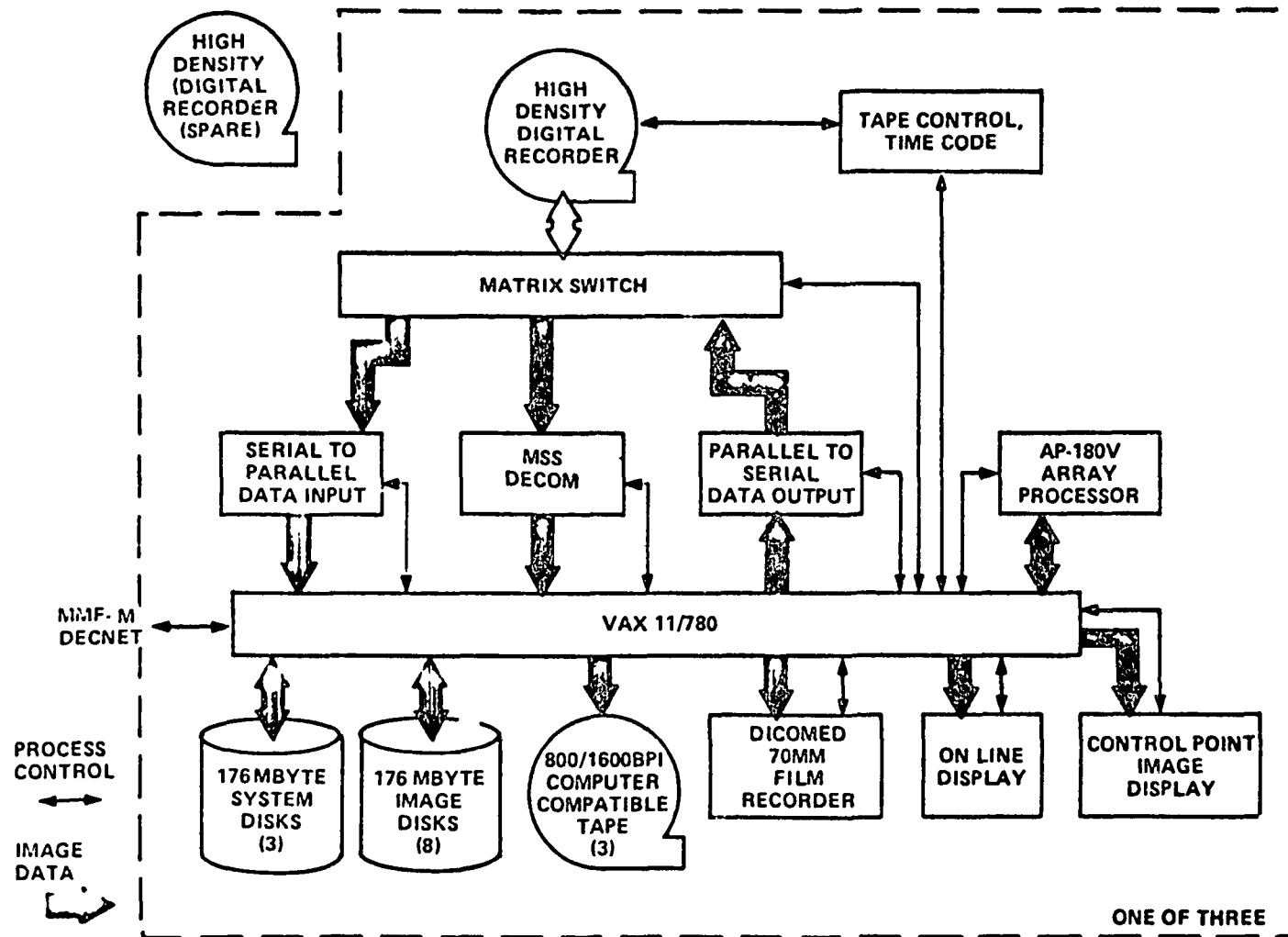
OUTPUT	NAME	USE	VOLUME(SCENES/DAY)
HIGH DENSITY TAPE – ARCHIVAL	HDT-AM	USER PRODUCT	200
COMPUTER COMPATIBLE TAPE-ARCHIVAL	CCT-AM	PERFORMANCE EVALUATION	} TOTAL OF 2
COMPUTER COMPATIBLE TAPE-PRODUCT	CCT-PM	PERFORMANCE EVALUATION	
241 MM FILM – ARCHIVAL	F241-AM	PERFORMANCE EVALUATION	} TOTAL OF 4
241 MM FILM – PRODUCT	F241-PM	PERFORMANCE EVALUATION	
70 MM FILM – ARCHIVAL	F70-AM	PERFORMANCE EVALUATION	
			200 (IN ONE BAND)

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MSS IMAGE PROCESSING SYSTEM INTERFACES

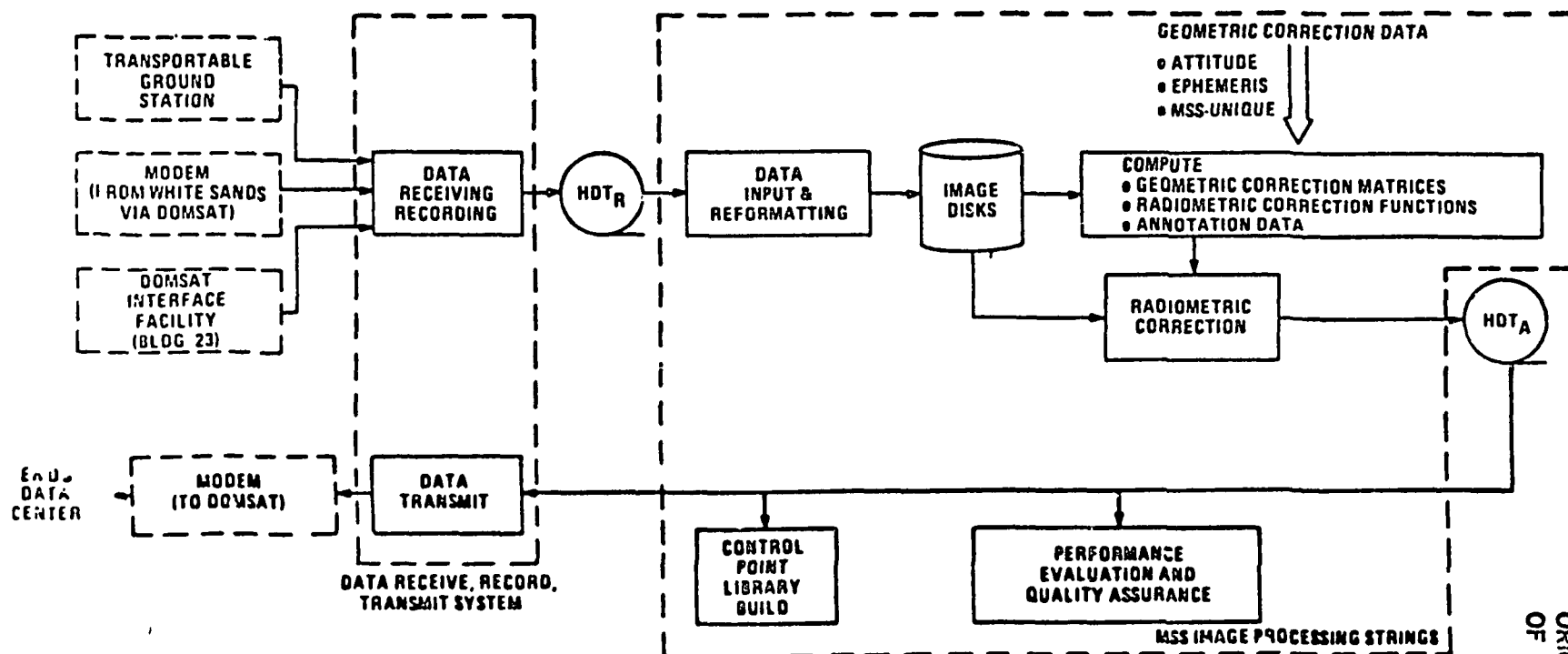


MSS IMAGE PROCESSING SYSTEM HARDWARE



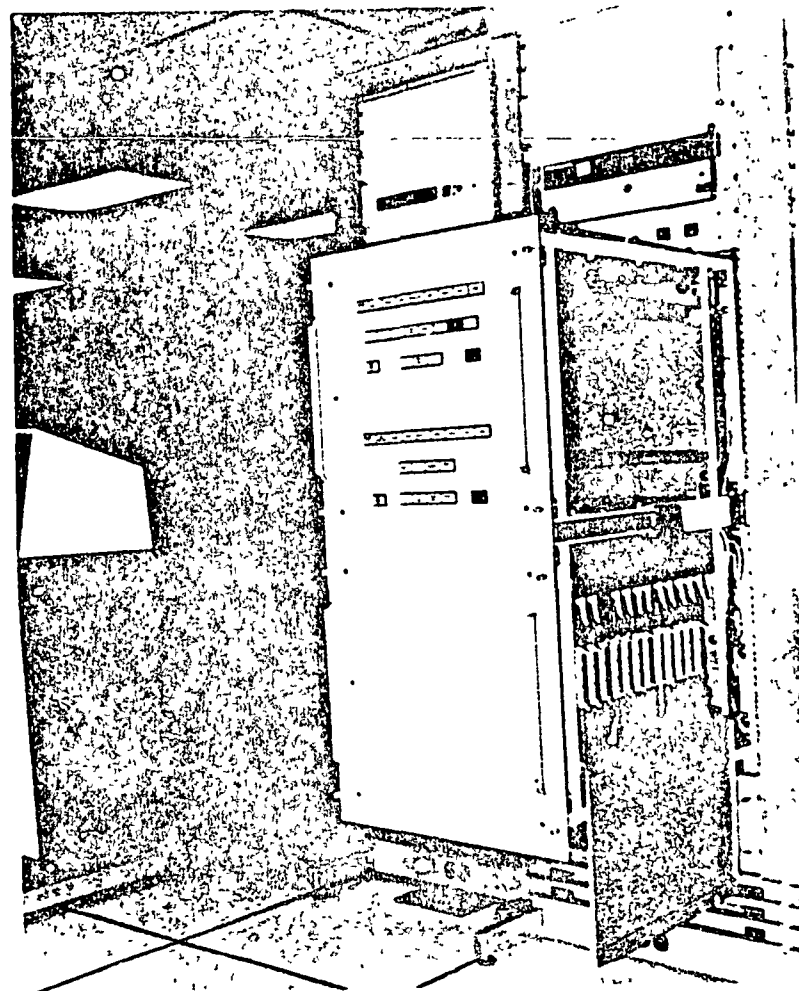
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MULTISPECTRAL SCANNER IMAGE GENERATION PROCESS FLOW

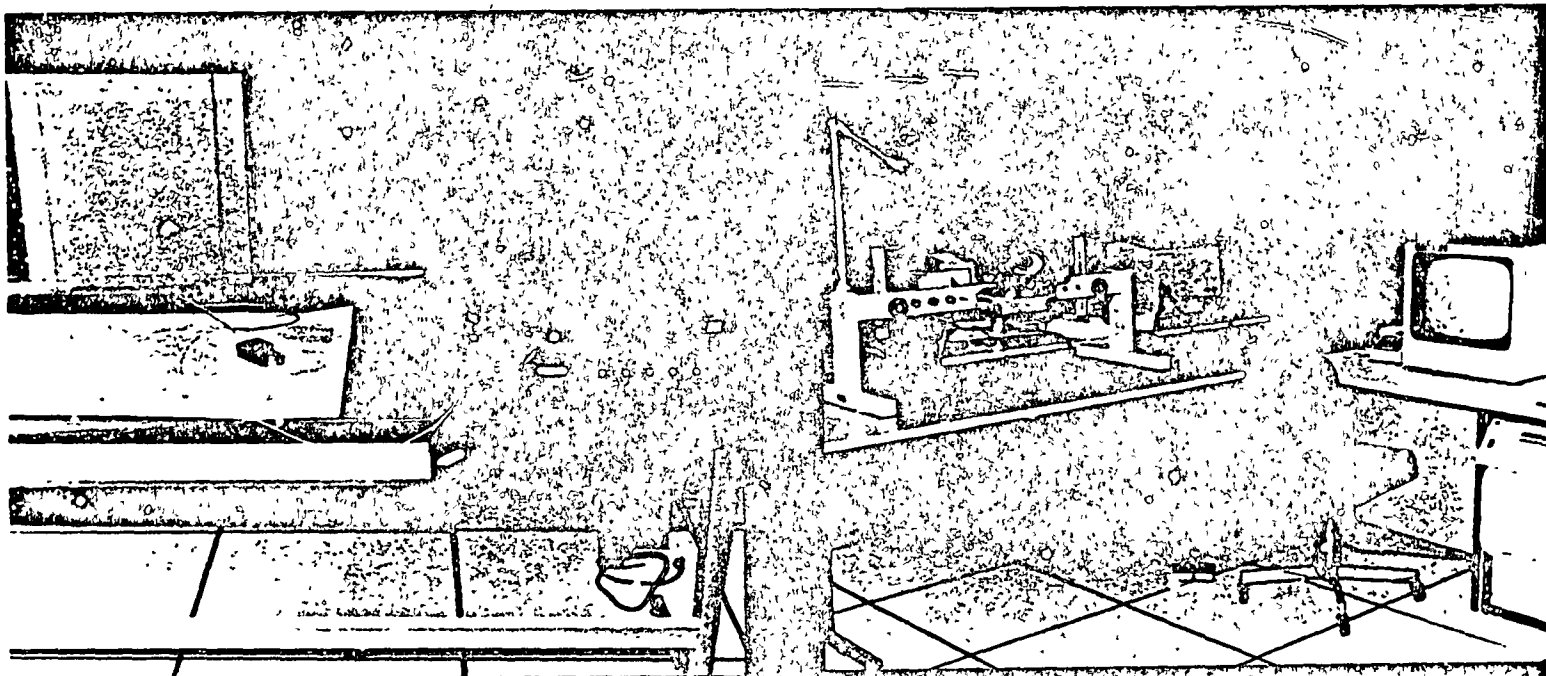


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SERIAL-TO-PARALLEL DATA INPUT FORMATTER
PARALLEL-TO-SERIAL DATA OUTPUT FORMATTER
MATRIX SWITCH



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CONTROL POINT LIBRARY
EQUIPMENT

SCIENTIFIC ASSOCIATES MODEL GPG-30

BAUSH & LOBB MODEL ZT4-H

COMITAL MODEL 30 SA

APR 1977

RESEARCH CENTER

1000 E. 10TH AVE.

ST. LOUIS, MO 63103

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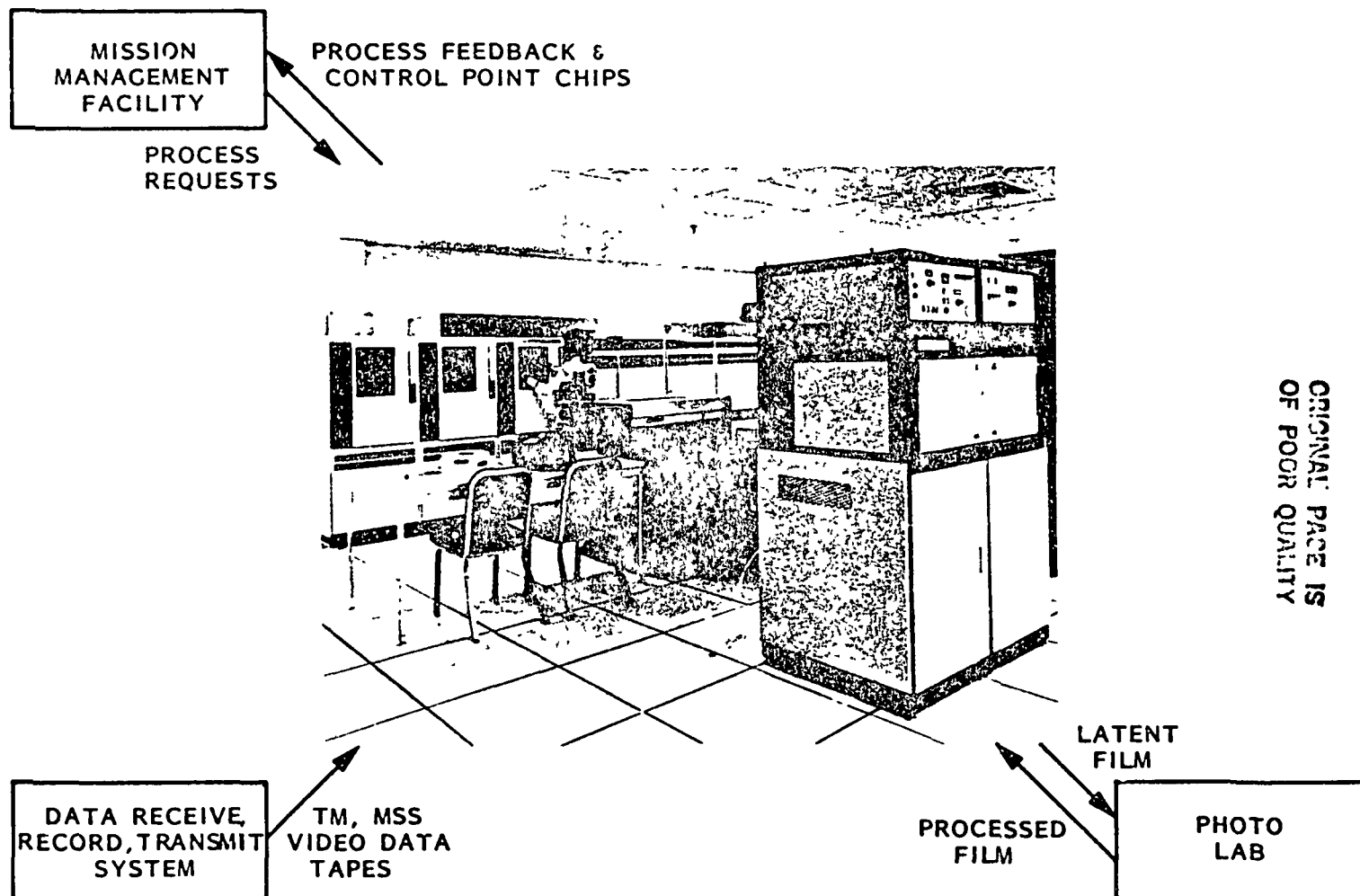
TM IMAGE PROCESSING SYSTEM MAJOR FUNCTIONS

- **PROCESS IMAGE RELATED CORRECTION DATA**
 - GYRO
 - ANGULAR DISPLACEMENT SENSOR
 - MIRROR SCAN CORRECTION
 - EPHEMERIS
- **GENERATE 28-TRACK ARCHIVAL TAPES**
 - RADIOMETRICALLY CORRECTED
 - GEOMETRIC CORRECTIONS APPENDED
- **GENERATE 28-TRACK FULLY CORRECTED TAPE**
- **GENERATE HIGH RESOLUTION FILM AND COMPUTER COMPATIBLE TAPE PRODUCTS**
- **CREATE QUALITY ASSURANCE REPORTS**

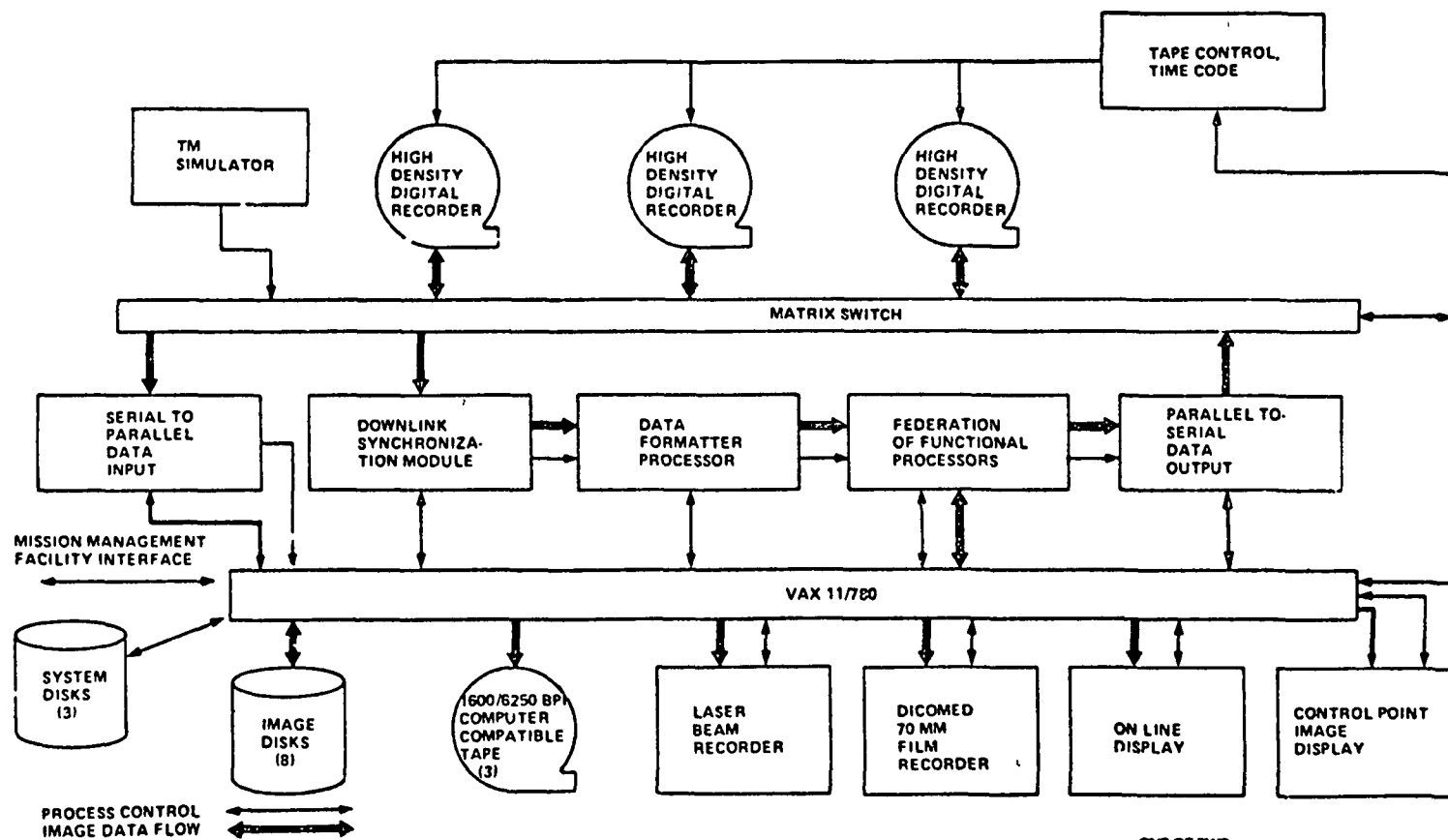
PRODUCTION REQUIREMENTS TM DATA

OUTPUT	NAME	USE	VOLUME (SCENES/DAY)	
			R&D PERIOD	NOAA OPERATIONS
HIGH DENSITY TAPE – ARCHIVAL	HDT-AT	USER PRODUCT & PERFORMANCE EVALUATION	12	100
HIGH DENSITY TAPE – PRODUCT	HDT-PT	USER PRODUCT & PERFORMANCE EVALUATION	12	50
COMPUTER COMPATIBLE TAPE – ARCHIVAL	CCT-AT	USER PRODUCT & PERFORMANCE EVALUATION	} TOTAL OF 2	} TOTAL OF 10
COMPUTER COMPATIBLE TAPE – PRODUCT	CCT-PT	USER PRODUCT & PERFORMANCE EVALUATION		
241 MM FILM – ARCHIVAL	F241-AT	PERFORMANCE EVALUATION	} TOTAL OF 12	} TOTAL OF 50
241 MM FILM – PRODUCT	F241-PT	USER PRODUCT & PERFORMANCE EVALUATION		
70 MM FILM – ARCHIVAL	F70-AT	PERFORMANCE EVALUATION	12 (IN 2 BANDS)	100 (IN 2 BANDS)

TM IMAGE PROCESSING SYSTEM INTERFACES

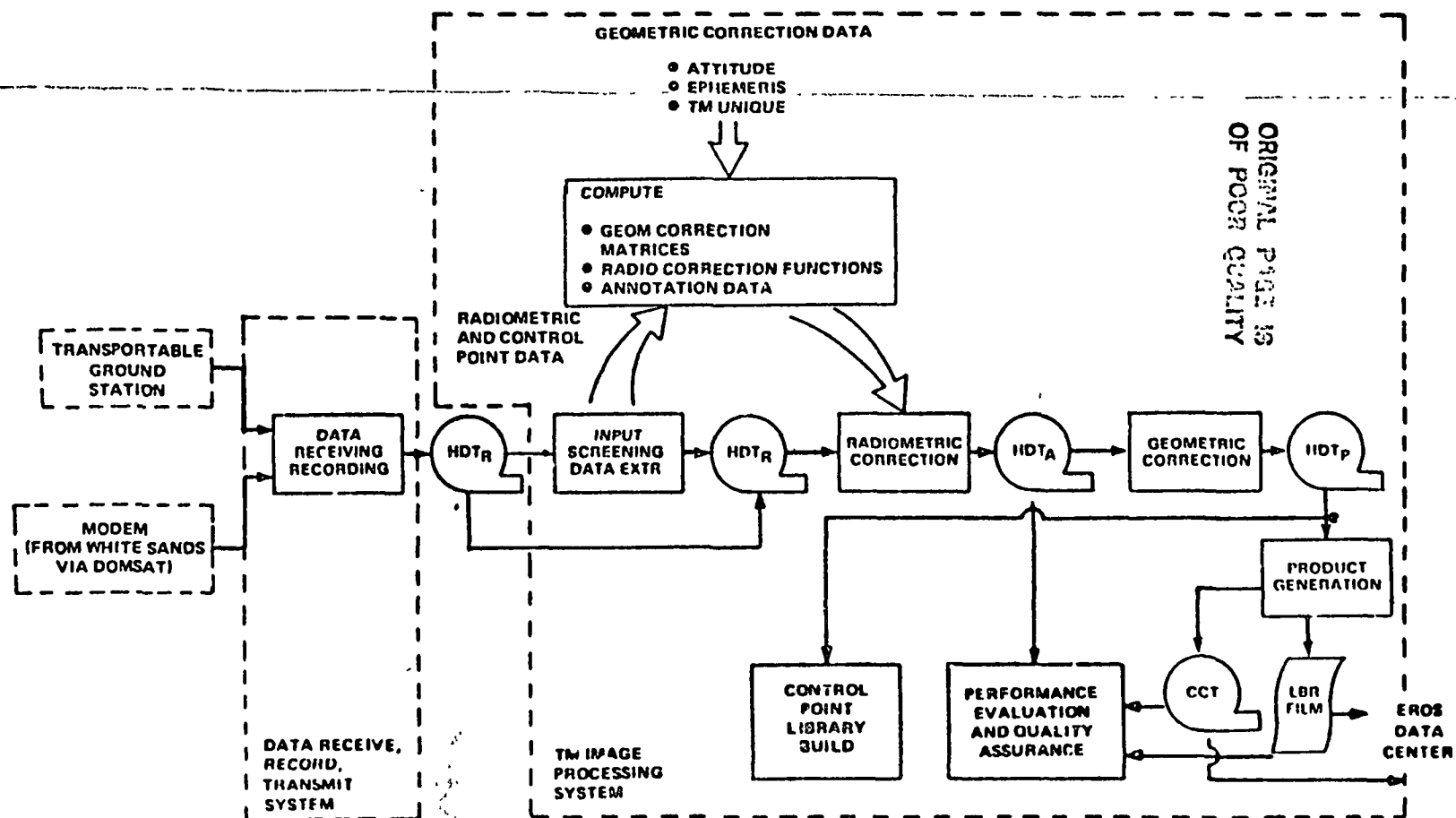


TM IMAGE PROCESSING SYSTEM HARDWARE

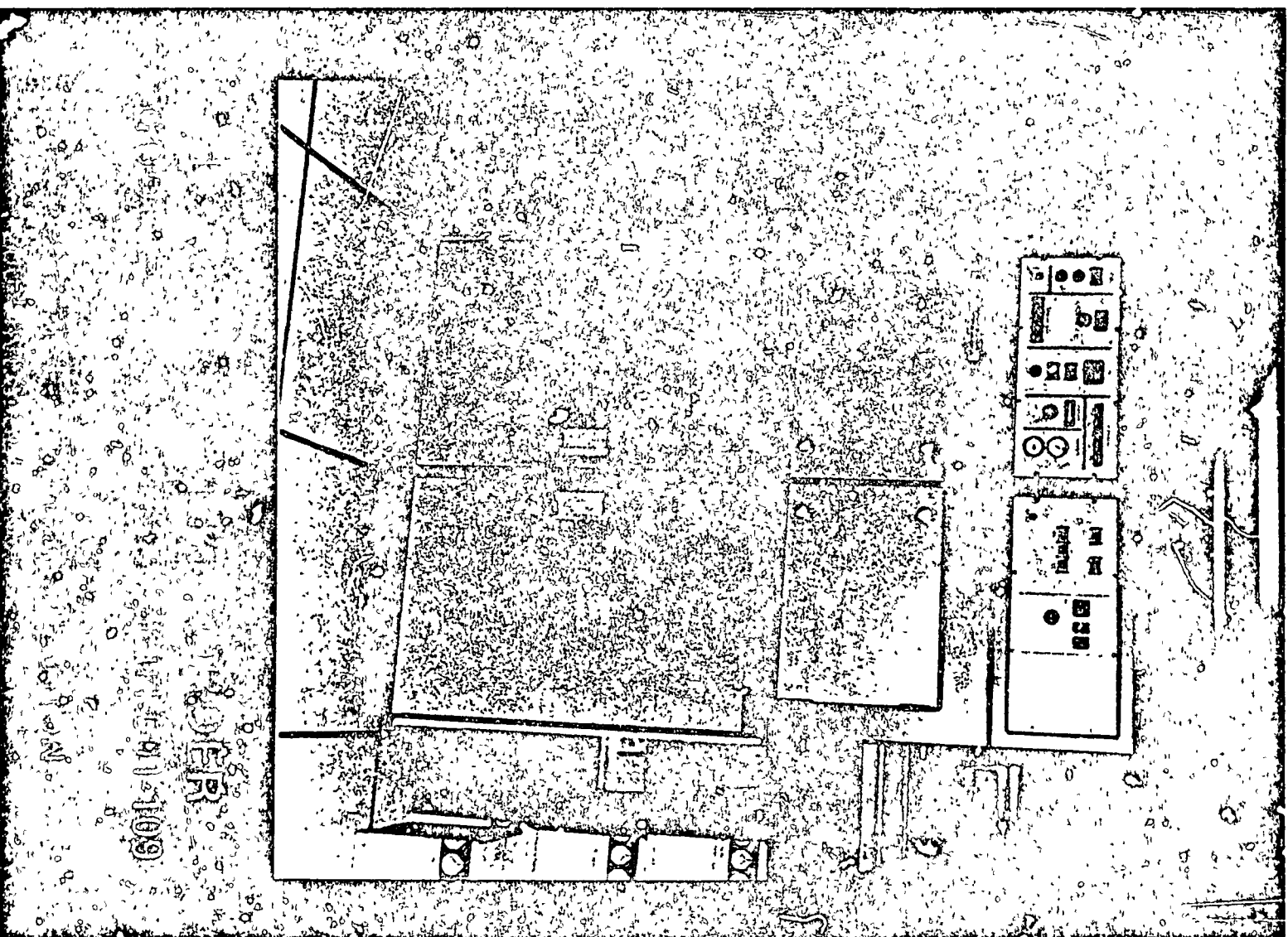


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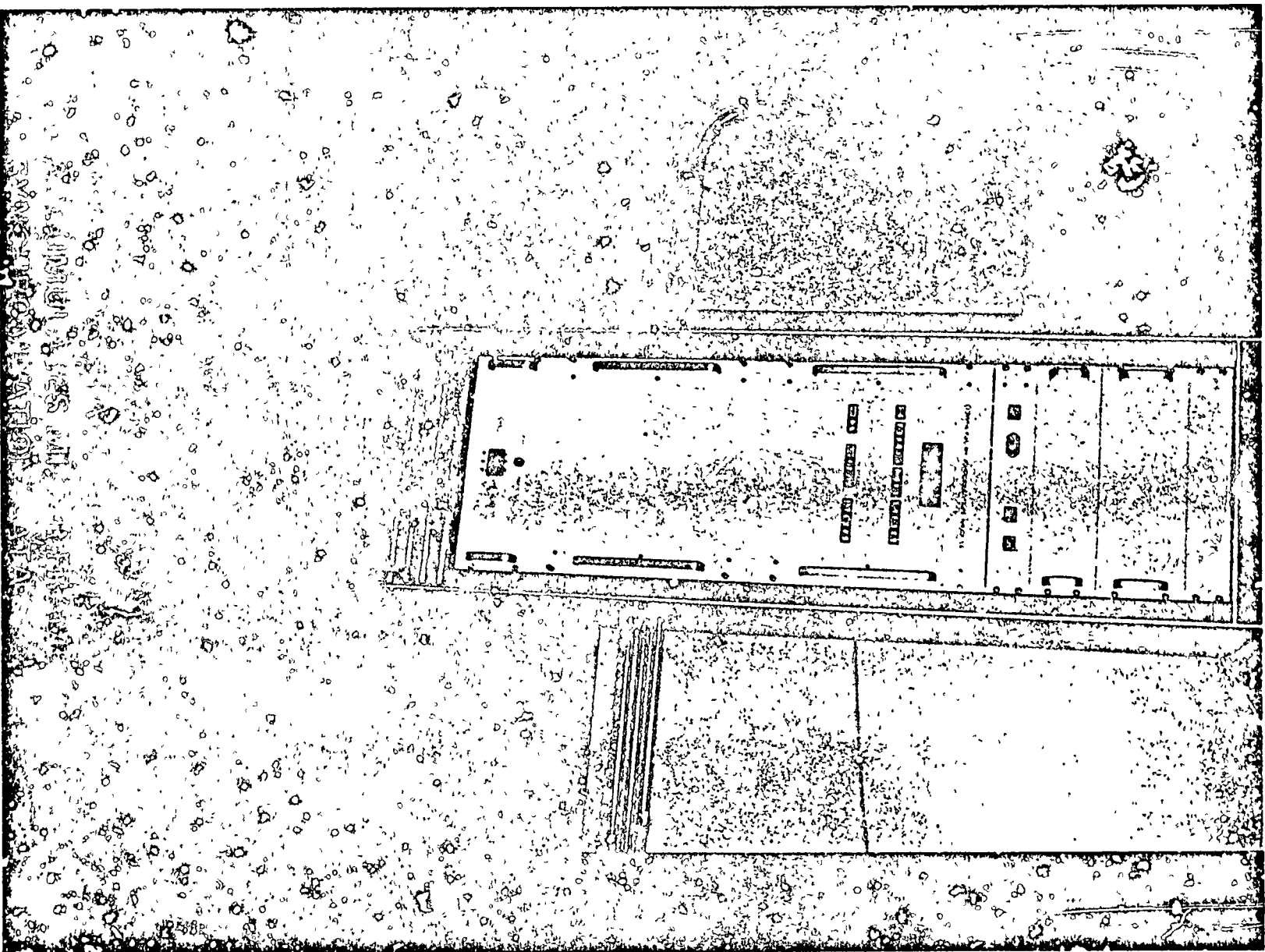
THEMATIC MAPPER IMAGE GENERATION PROCESS FLOW



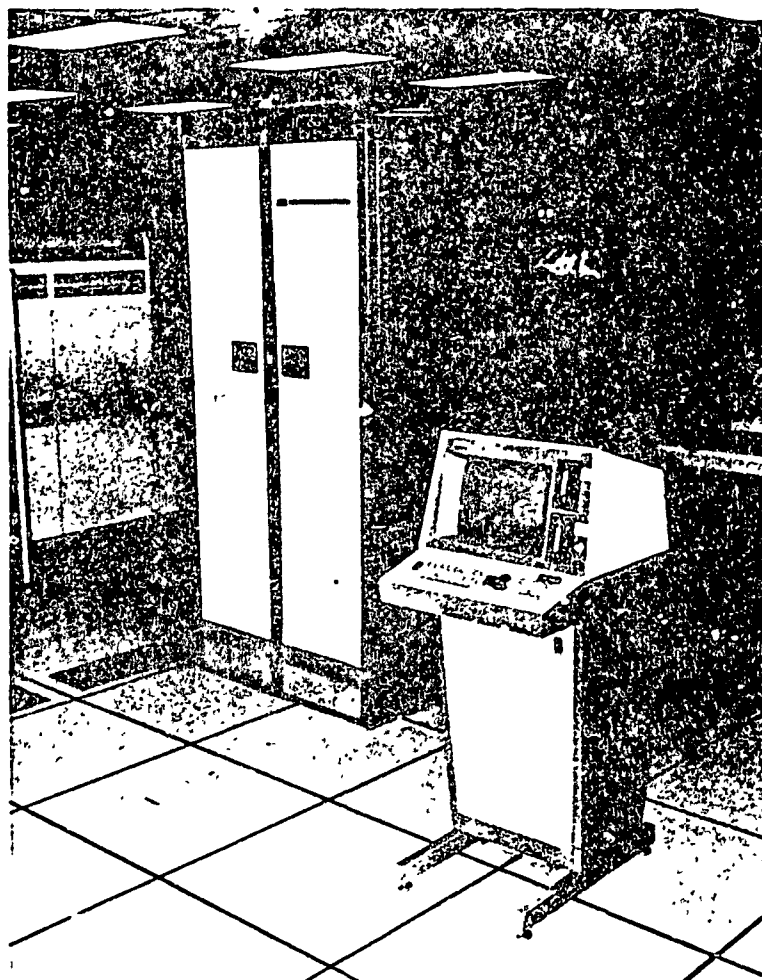
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FEDERATION OF FUNCTIONAL PROCESSORS WITH CONTROL TERMINAL



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GROUND SEGMENT SUMMARY

HARDWARE

- **MAINFRAMES**

- 1 PDP 11/34

- 1 DEC 20/50

- 1 DEC 20/60

- 8 VAX 11/780

- 1 PDP 11/23

- **ARRAY PROCESSORS**

- 3 AP 180V

- 2 FFP

- **DISKS**

- 76 176 MBYTE

- **RACKS**

- 16 CUSTOM

- 16 STACKED

- **FIRMWARE**

- 16,000 LINES

- **HIGH DENSITY RECORDERS**

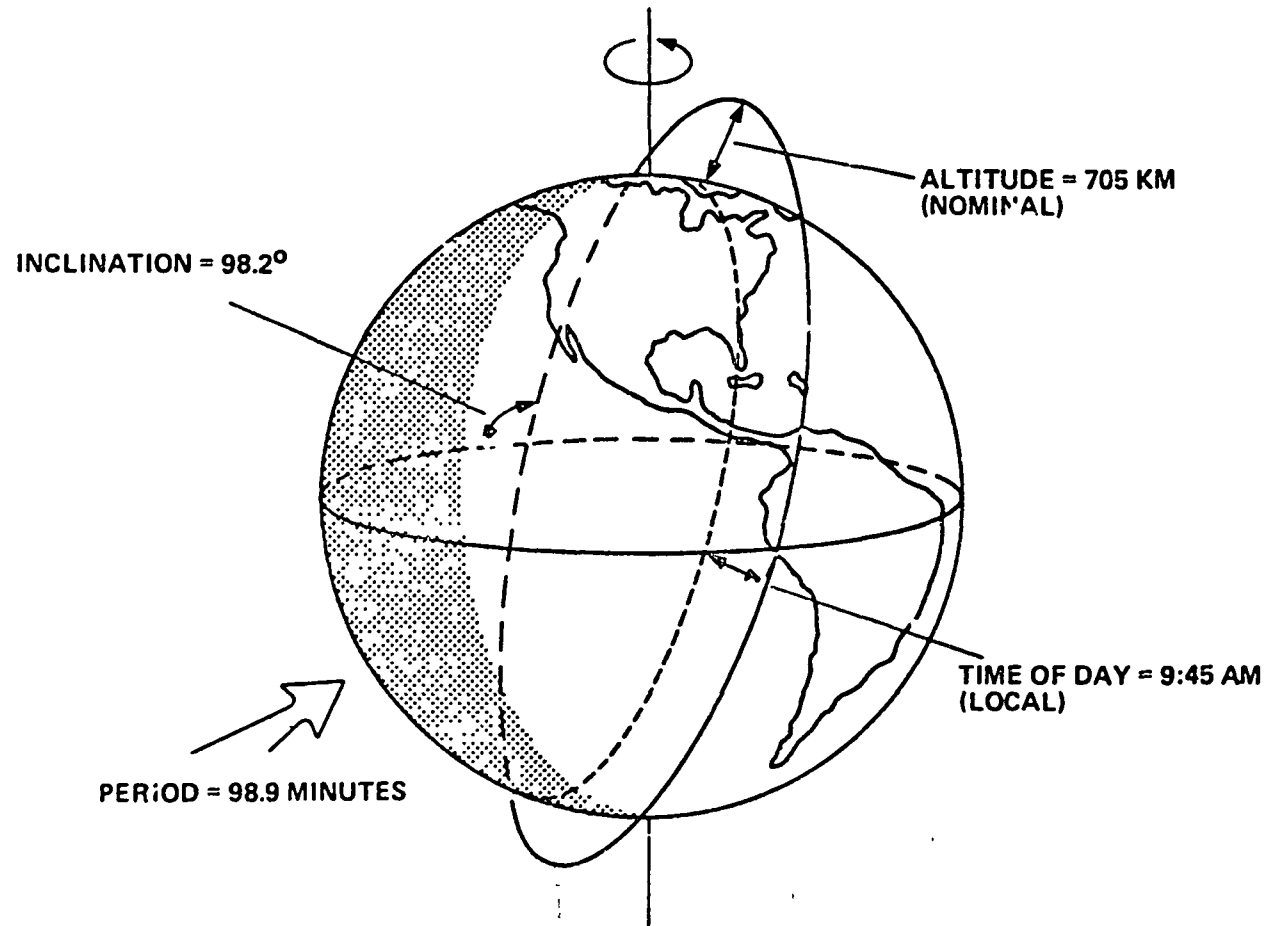
- 2 14-TRACK

- 12 28-TRACK

- 2 28/42-TRACK

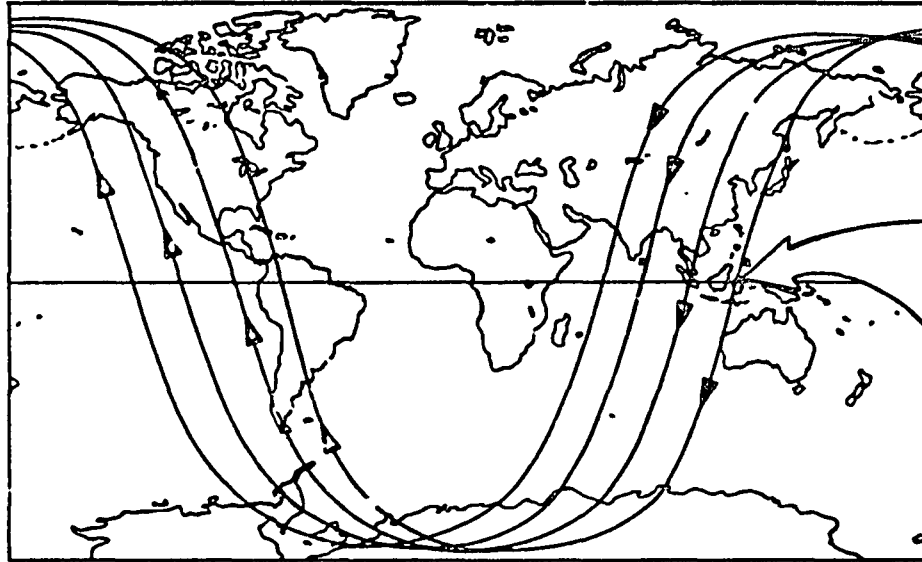
MISSION OPERATIONS

LANDSAT-D ORBIT

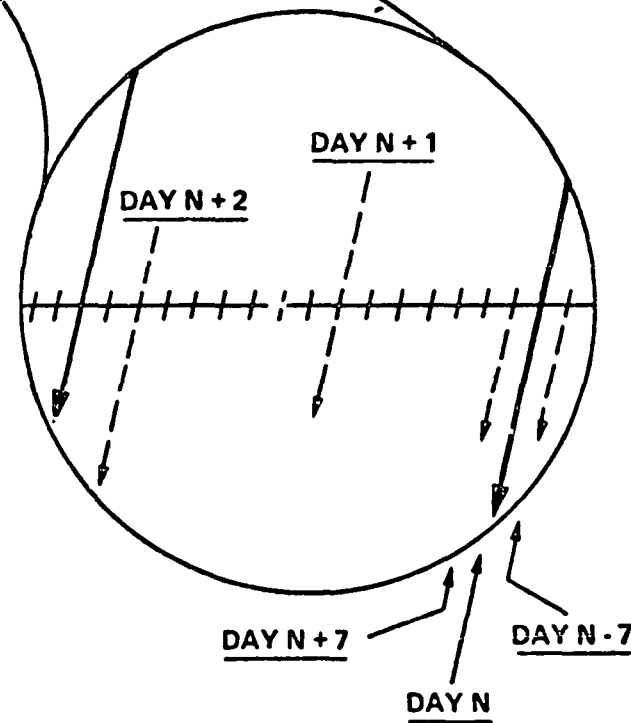


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GROUND TRACK COVERAGE PATTERN

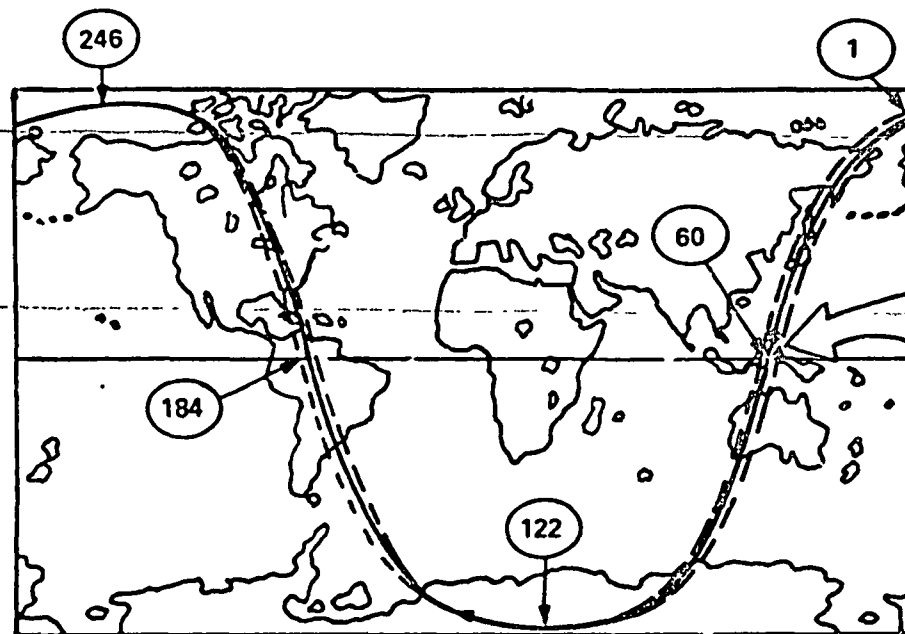


- 14½ ORBITS PER DAY
- 16-DAY REPEAT CYCLE
- 7-DAY SKIP PATTERN



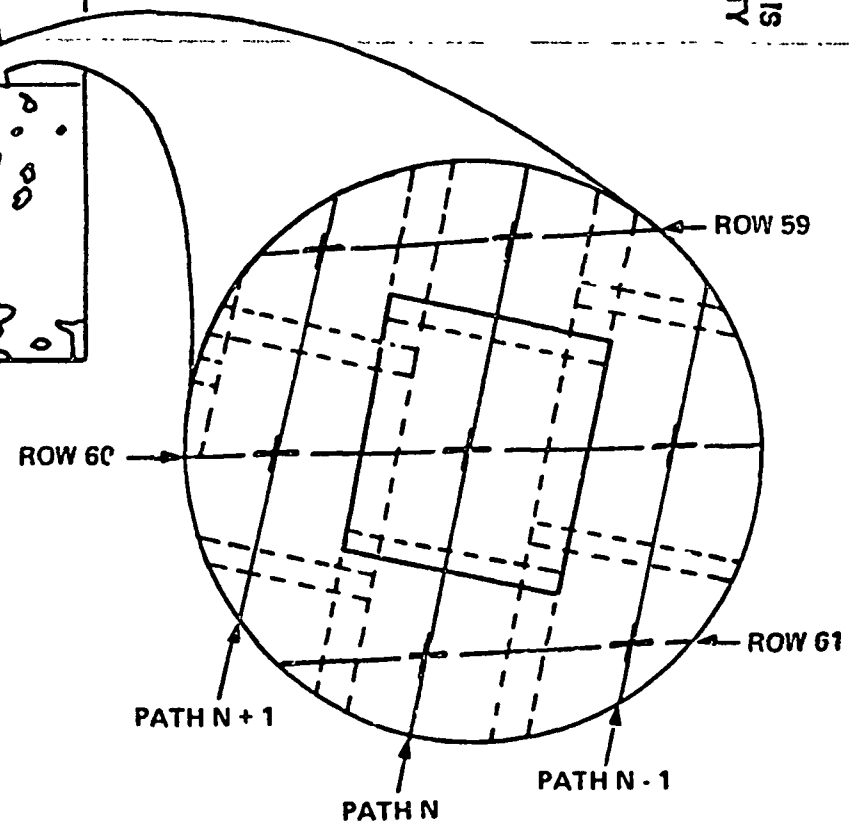
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WORLDWIDE REFERENCE SYSTEM

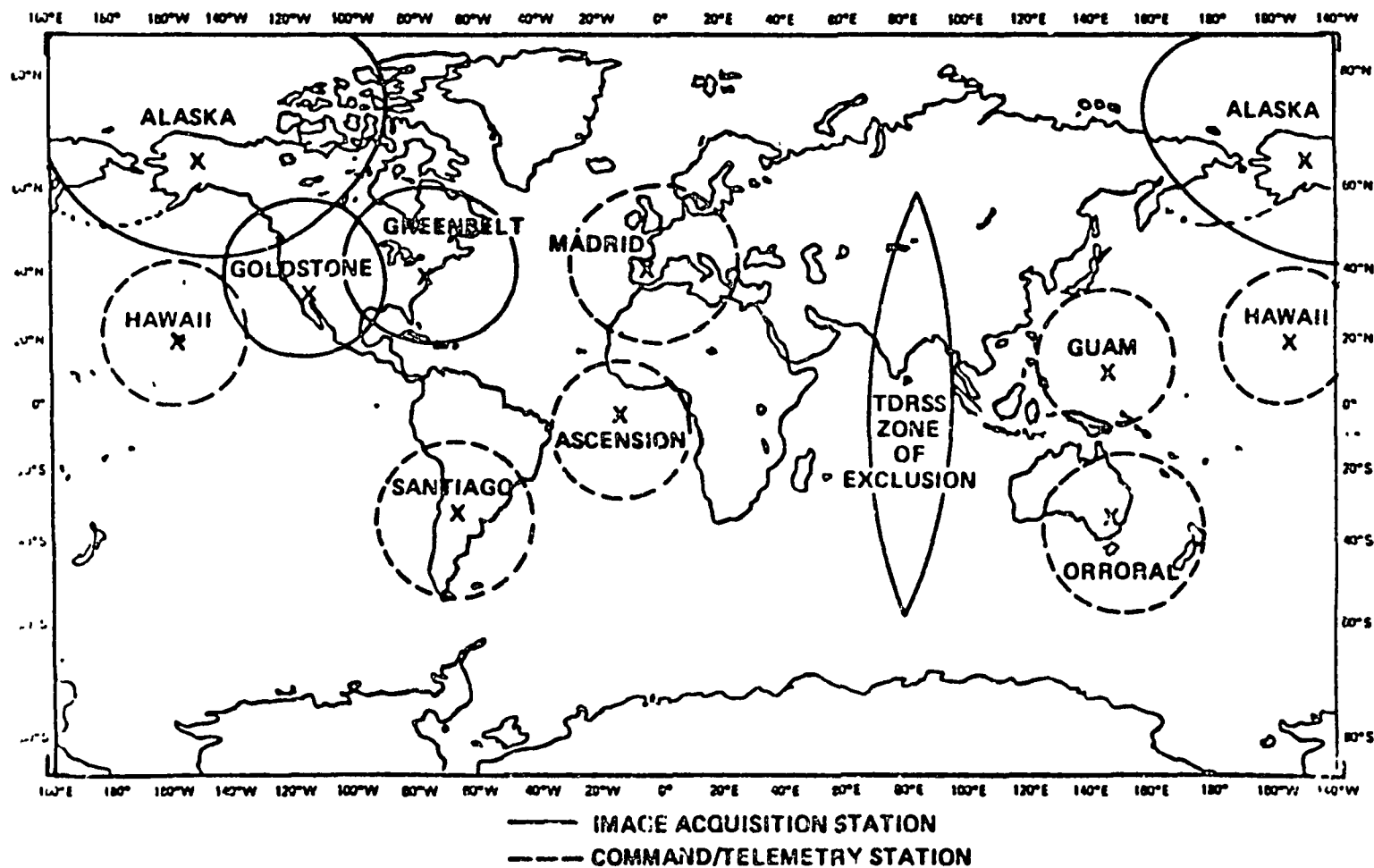


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- 233 PATHS
- 248 ROWS PER PATH
- PATH 1 - EQUATOR
AT 64.6° W

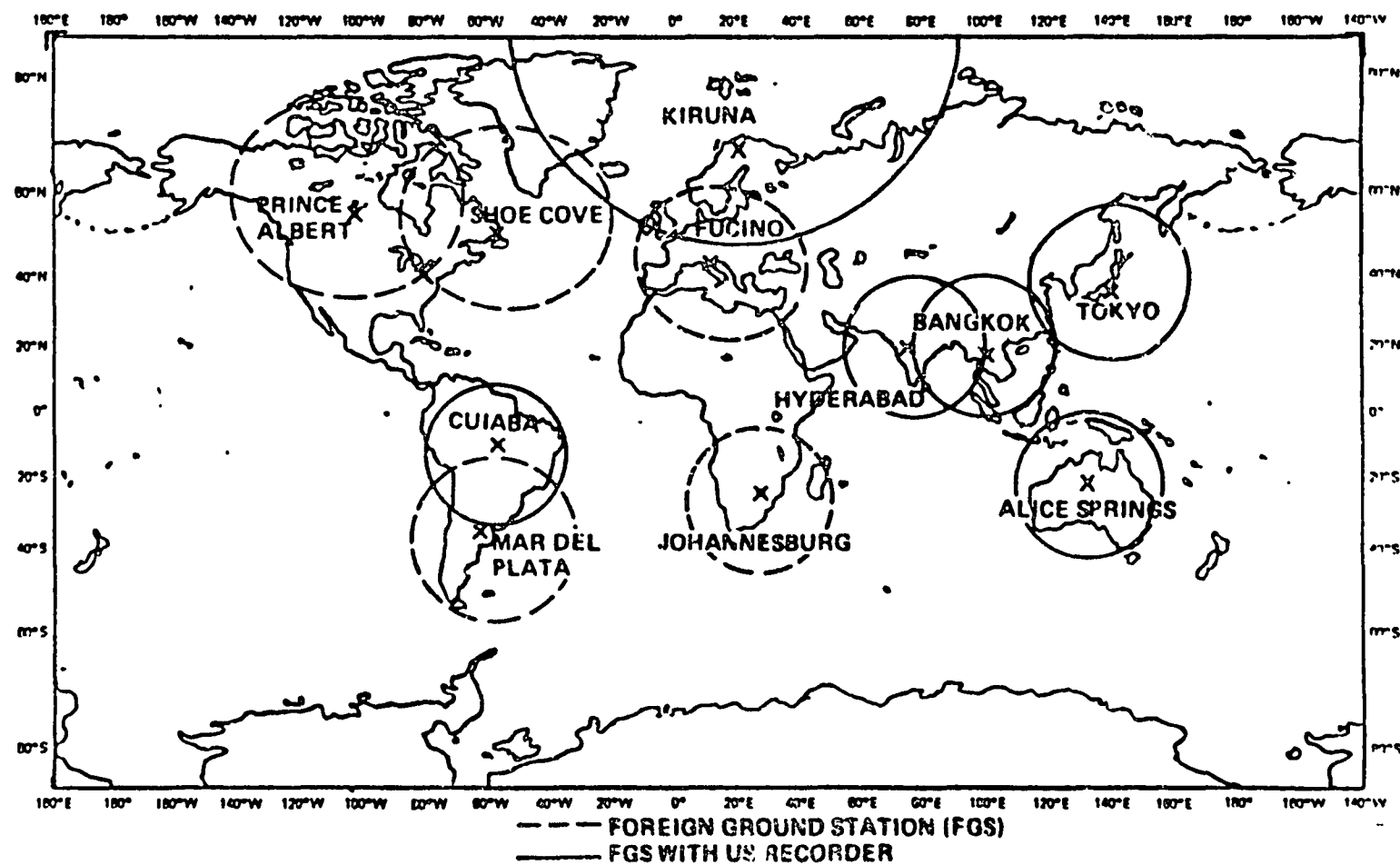


U.S: GROUND STATION COVERAGE



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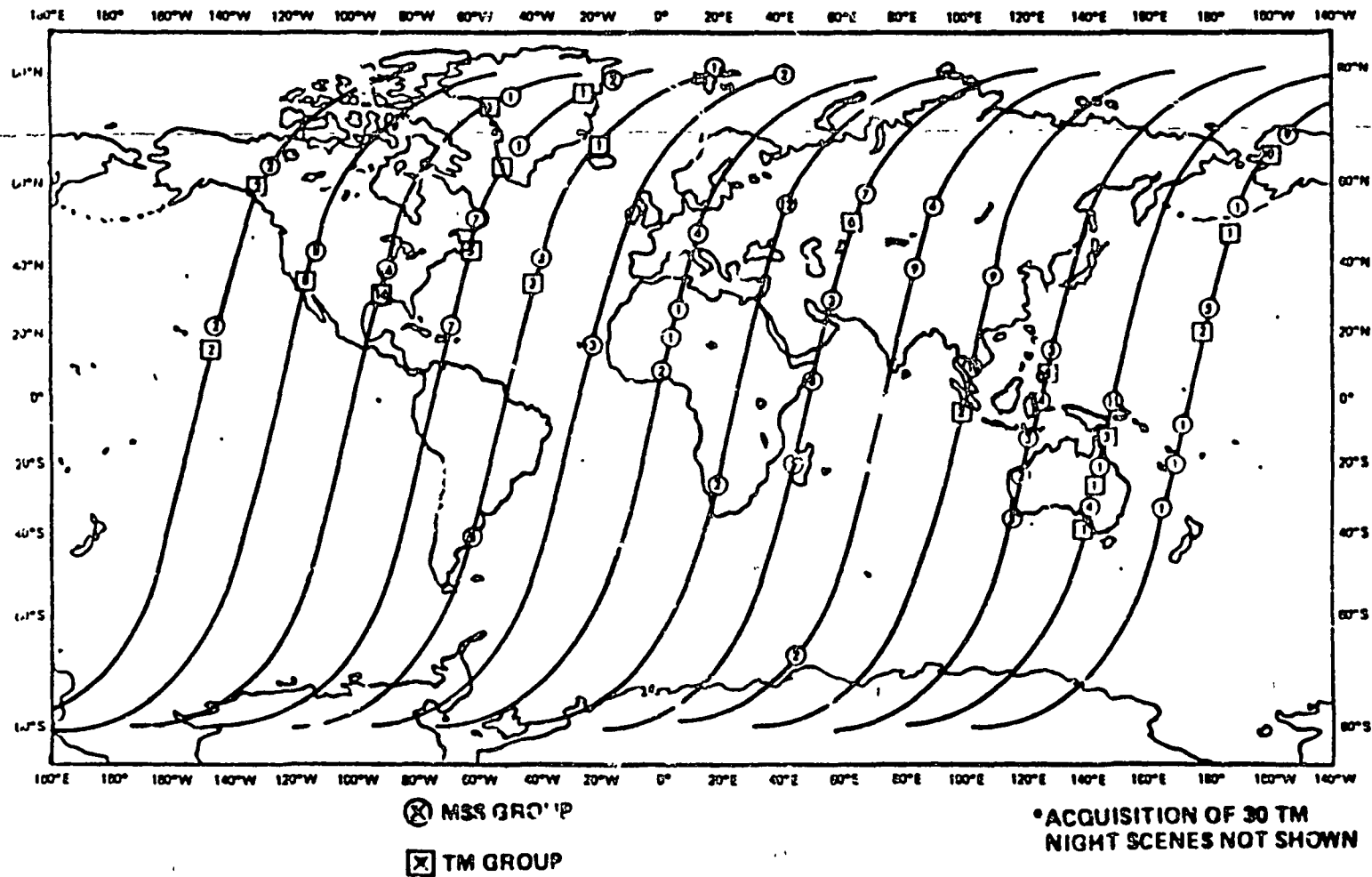
FOREIGN GROUND STATION COVERAGE



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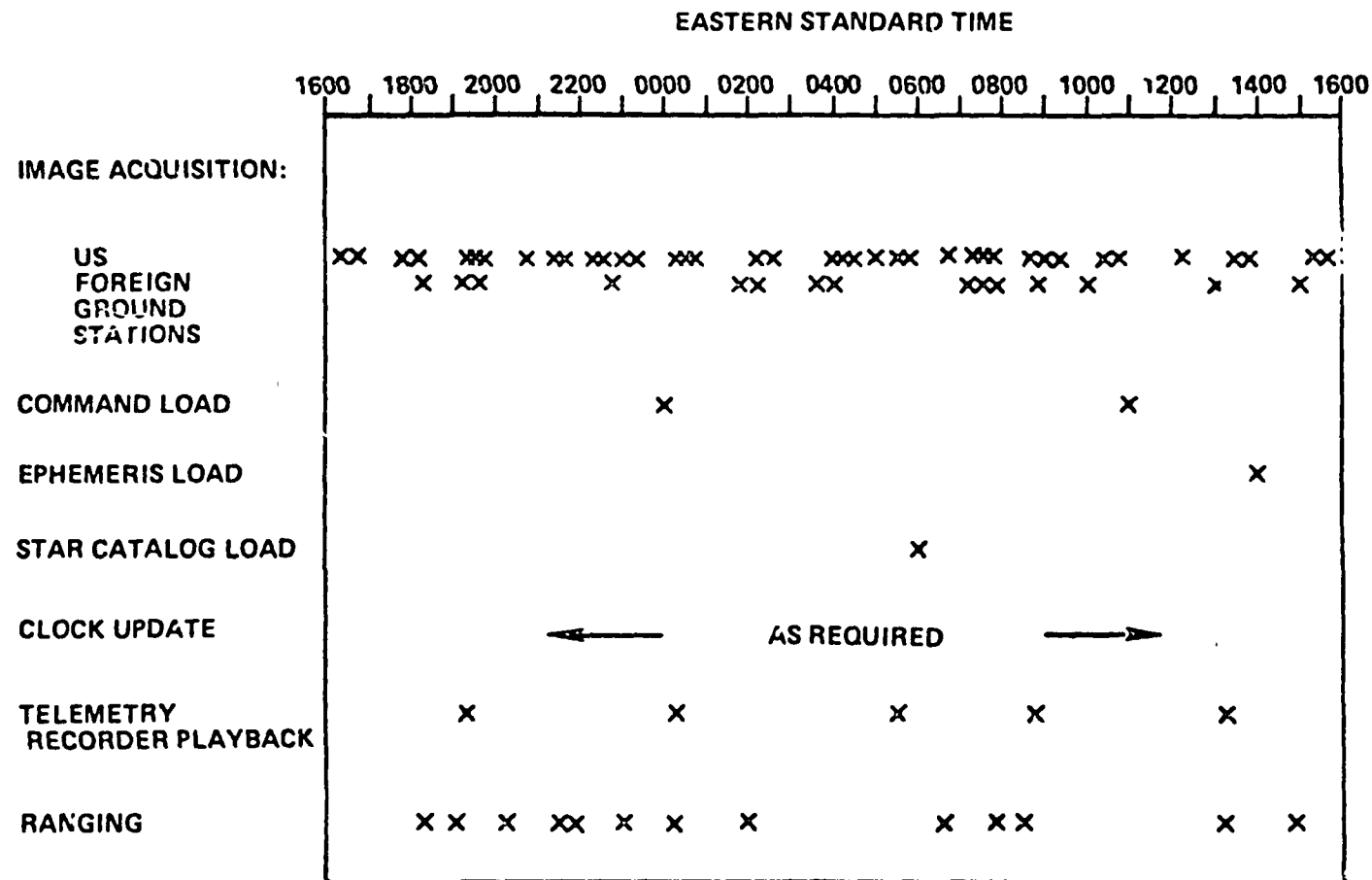
TYPICAL U.S. DAILY ACQUISITION PROFILE

MSS ACQUISITION: 200 SCENES IN 44 GROUPS
TM ACQUISITION: 70 SCENES IN 19 GROUPS*



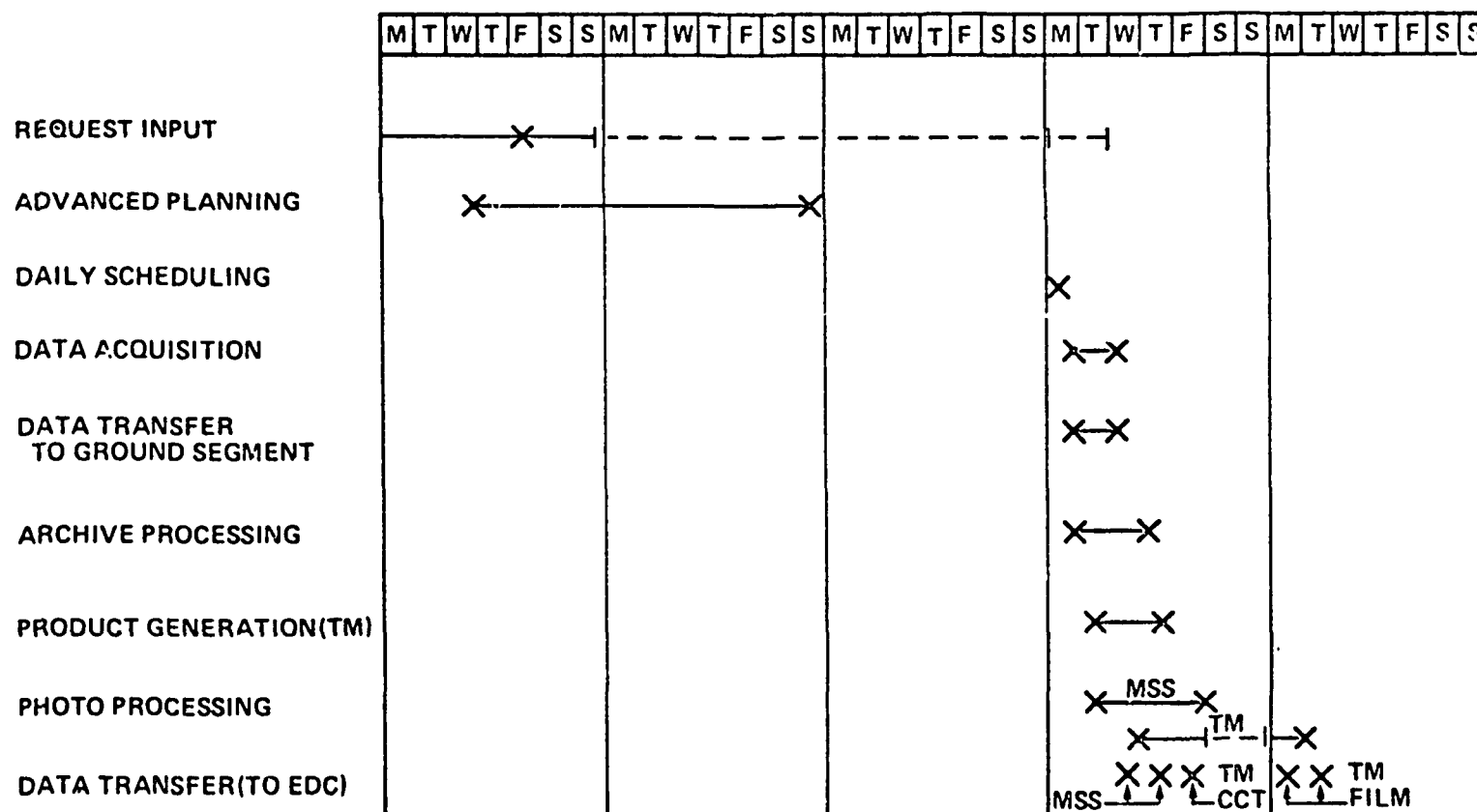
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TYPICAL DAILY FLIGHT SEGMENT OPERATION PROFILE



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TYPICAL DATA ACQUISITION/PROCESSING TIMELINE



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CURRENT MAINTENANCE AND OPERATION ACTIVITIES

- **MAINTENANCE AND OPERATION STAFF**
- **TECHNICAL SUPPORT GROUP**
- **REPLACEMENT CONTRACTOR TRAINING**
- **MAINTENANCE SUPPORT SERVICES**
- **SPARES AND CONSUMABLES**
- **TOOLS AND TEST EQUIPMENT**

GROUND SEGMENT MAINTENANCE AND OPERATION STAFF

- **MANAGEMENT**
 - OPERATIONAL COORDINATION AND SUPERVISION
 - LINE MANAGEMENT
- **ORBITAL OPERATIONS**
 - FLIGHT OPERATIONS PLANNING
 - FLIGHT CONTROL AND EVALUATION
 - TGS OPERATION
- **DATA PROCESSING**
 - COMPUTER SYSTEM OPERATIONS
 - CLOUD COVER ASSESSMENT
 - CONTROL POINT GENERATION AND MAINTENANCE
- **PRODUCTION CONTROL**
 - PRODUCTION PLANNING AND MANAGEMENT
 - LOGISTICS
 - DATA AND PRODUCT STAGING
- **ENGINEERING SUPPORT**
 - SYSTEM ENGINEERING
 - HARDWARE AND SOFTWARE MAINTENANCE
 - PERSONNEL TRAINING
- **QUALITY AND PRODUCT ASSURANCE**
 - IMAGE AND PRODUCT INSPECTION AND ANALYSIS
 - PROBLEM REPORT AND TRACKING SYSTEM
 - CONFIGURATION MANAGEMENT
 - LIBRARY

GROUND SEGMENT OPERATING SCHEDULES

- CONTROL CENTER - 3 SHIFTS/7 DAYS PER WEEK
- TGS - 1 SHIFT/7 DAYS PER WEEK
- DRRTS SYSTEM - 2 SHIFTS/7 DAYS PER WEEK
- MISSION MGMT SYSTEM (MSS) - 2 SHIFTS/7 DAYS PER WEEK
- MSS PROCESSING SYSTEM - 2 SHIFTS/7 DAYS PER WEEK
- MISSION MGMT SYSTEM (TM) - 1 SHIFT/5 DAYS PER WEEK (INITIAL OPERATION)
- 3 SHIFTS/7 DAYS PER WEEK (FULL PRODUCTION)
- TM PROCESSING SYSTEM - 1 SHIFT/5 DAYS PER WEEK (INITIAL OPERATION);
- 3 SHIFTS/7 DAYS PER WEEK (FULL PRODUCTION)

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OPERATIONAL SUPPORT SUMMARY - FLIGHT OPERATION

SPACEFLIGHT TRACKING & DATA NETWORK

TDRSS SINGLE-ACCESS SERVICE	- 300 MINUTES/DAY
TDRSS MULTIPLE-ACCESS SERVICE	- 300 MINUTES/DAY
GSTDN STATION SUPPORT	- 250 MINUTES/DAY*
DOMSAT SERVICE (WHITE SANDS TO GSFC)	- 240 MINUTES/DAY
DOMSAT SERVICE (GSTDN TO GSFC)	- 50 MINUTES/DAY*
DOMSAT SERVICE (GSFC TO EDC)	- 90 MINUTES/DAY

ORBITAL TERMINATION

FLIGHT SEGMENT COMPUTER INPUTS	- 1 TAPE/DAY
FLIGHT SEGMENT TELEMETRY EVALUATION	- 1 TAPE/DAY
STATION ACQUISITION DATA	- DAILY TELETYPE INPUTS
ORBITAL ELEMENTS	- DAILY TELETYPE INPUT
EPHEMERIS & STATION CONTACT DATA	- 2 TAPES/WEEK, LISTINGS

DOMSAT INTERFACE FACILITY

GSTDN IMAGE DATA RECEIPT	- 2 TAPES/DAY*
FOREIGN GROUND STATION IMAGE DATA RECEIPT	- 6 TAPES/DAY**

NATIONAL WEATHER SERVICE

CLOUD COVER PREDICTIONS (LAND MASS & OTHER AS REQUESTED)	- DAILY PHONEFAX INPUT
---	------------------------

* - UNTIL TDRSS CAPABILITY IS AVAILABLE

** - 1 TAPE/DAY AFTER TDRSS CAPABILITY IS AVAILABLE

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OPERATIONAL SUPPORT SUMMARY - DATA PROCESSING

PHOTO LABORATORY

PROCESSING & INSPECTION (241 MM)	-	700 FEET/DAY
PROCESSING & INSPECTION (70 MM)	-	40 FEET/DAY
FILM PRODUCT SHIPPING (241 MM-TM)	-	1 SHIPMENT/DAY (WITH INVENTORY TAPE)

DIGITAL TAPE SHIPPING & ARCHIVE

DIGITAL PRODUCT SHIPMENT (TM CCT)	-	54 REELS/DAY
TAPES INTO ARCHIVE (HDT)	-	16 REELS/DAY
TAPES INTO ARCHIVE (CCT)	-	5 REELS/DAY
TAPES RETRIEVED FROM ARCHIVE (HDT)	-	10 REELS/DAY
TAPES RETRIEVED FROM ARCHIVE (CCT)	-	10 REELS/MONTH

DOMSAT INTERFACE FACILITY

INVENTORY DATA TRANSMISSION (MSS)	-	1 TAPE/DAY
-----------------------------------	---	------------

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OPERATIONAL SPARES AND CONSUMABLES

(1) SPARES FOR:

CONTROL CENTER

- FS SIMULATION HARDWARE
- COMMUNICATION INTERFACE EQUIPMENT
- TGS SYSTEMS
- TIMING EQUIPMENT
- ELECTRONIC SIGNAL PROCESSING EQUIPMENT
- DISPLAY UNITS

DATA PROCESSING SYSTEMS

- INSTRUMENT SIMULATORS
- HDDR HEADS & TEST EQUIPMENT
- HDT SERVICING EQUIPMENT
- ELECTRONIC SIGNAL PROCESSING EQUIPMENT
- ADP DISK PACKS
- 6250 BPI TAPE DRIVES
- 241 MM FILM RECORDER & FILM HANDLING UNITS

(2) CONSUMABLES:

- HIGH DENSITY TAPE
- COMPUTER TAPE
- 241 MM FILM
- 70 MM FILM
- POLAROID FILM
- LINE PRINTER PAPER, RIBBONS
- STRIP-CHART PAPER, PENS, INK
- HARDCOPY PRINTER PAPER, PENS, FLUIDS
- TERMINAL PAPER, RIBBONS, LABELS
- GENERAL SUPPLIES

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CURRENT GROUND SEGMENT MAINTENANCE SUPPORT SERVICES

CONTROL CENTER:

4 SERVICE AGREEMENTS

4 VENDOR-CALL ARRANGEMENTS

2 SOFTWARE UPDATE/CONSULTATION AGREEMENTS

DATA PROCESSING SYSTEM:

7 SERVICE AGREEMENTS

8 VENDOR CALL ARRANGEMENTS

3 VENDOR RETURN ARRANGEMENTS

1 SOFTWARE UPDATE/CONSULTATION AGREEMENT

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APPROXIMATE GROUND SEGMENT COMPUTER FACILITY REQUIREMENTS

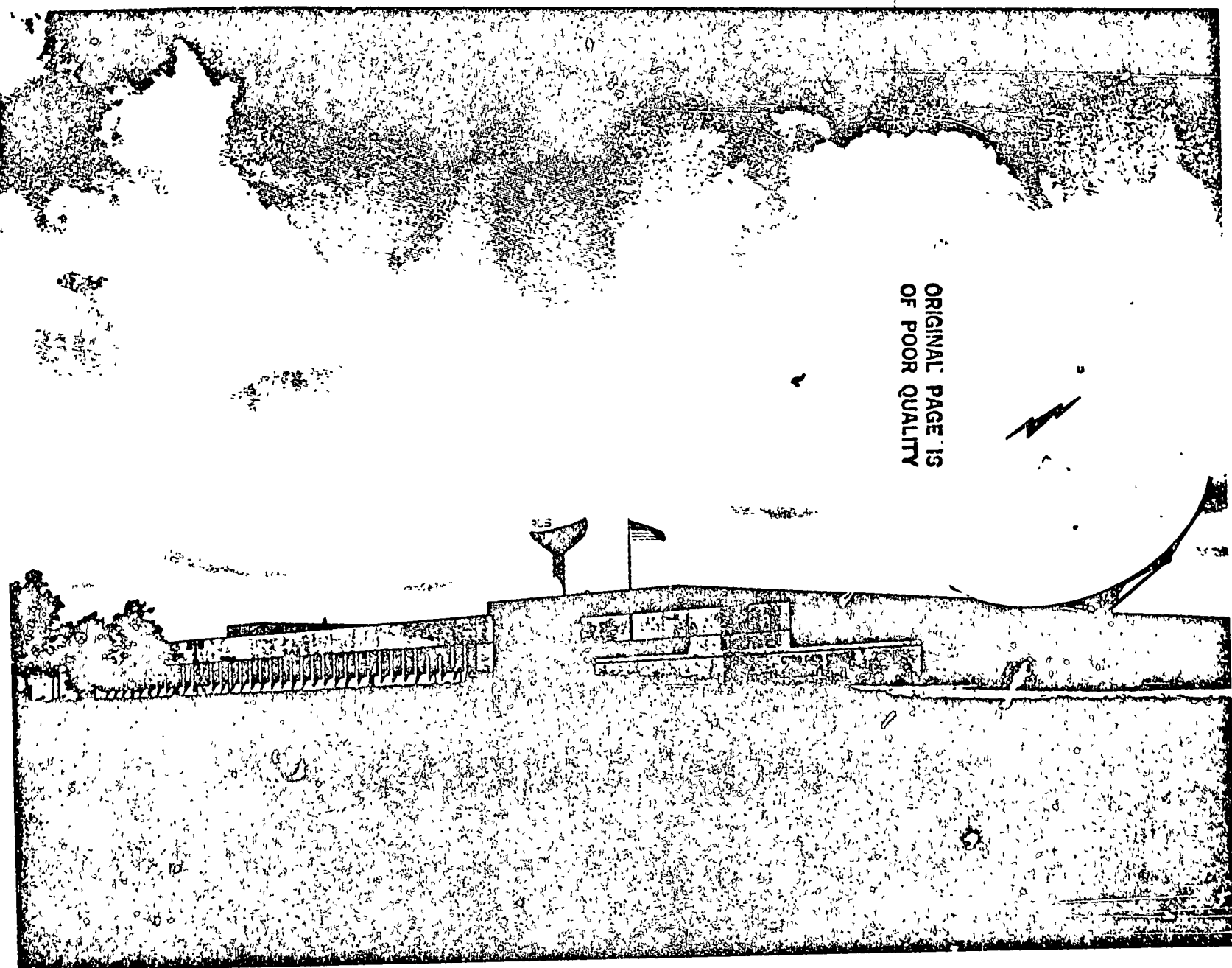
	CONTROL CENTER	DATA PROCESSING SYSTEMS
FLOOR SPACE	8050 SQ FT	12,100 SQ FT
EQUIPMENT WEIGHT	45,000 LBS	83,000 LBS
ELECTRICAL POWER	150 KVA	350 KVA
AIR CONDITIONING	45 TONS	110 TONS

EROS DATA CENTER

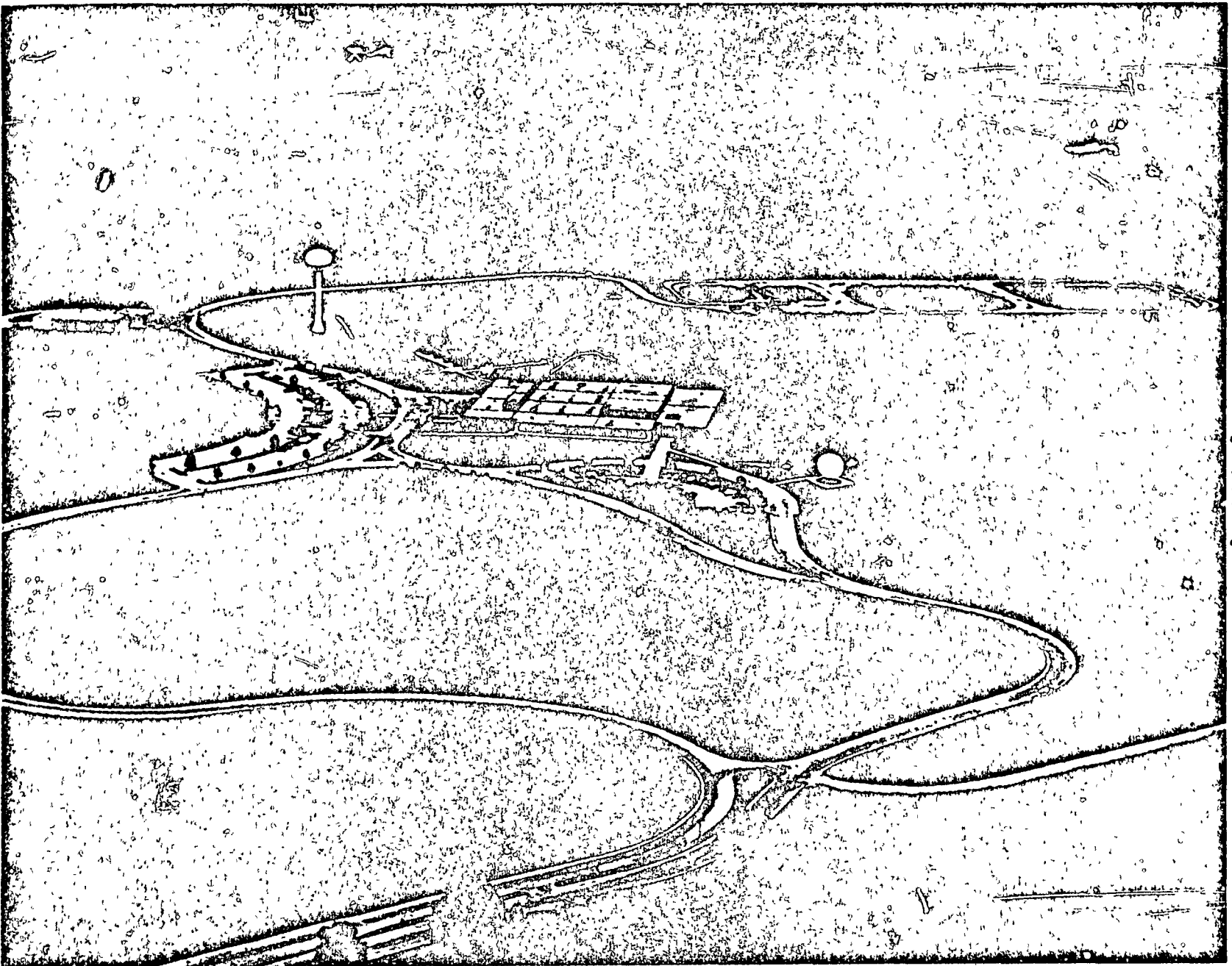
LANDSAT D - INDUSTRY BRIEFING

FEBRUARY 26, 1982

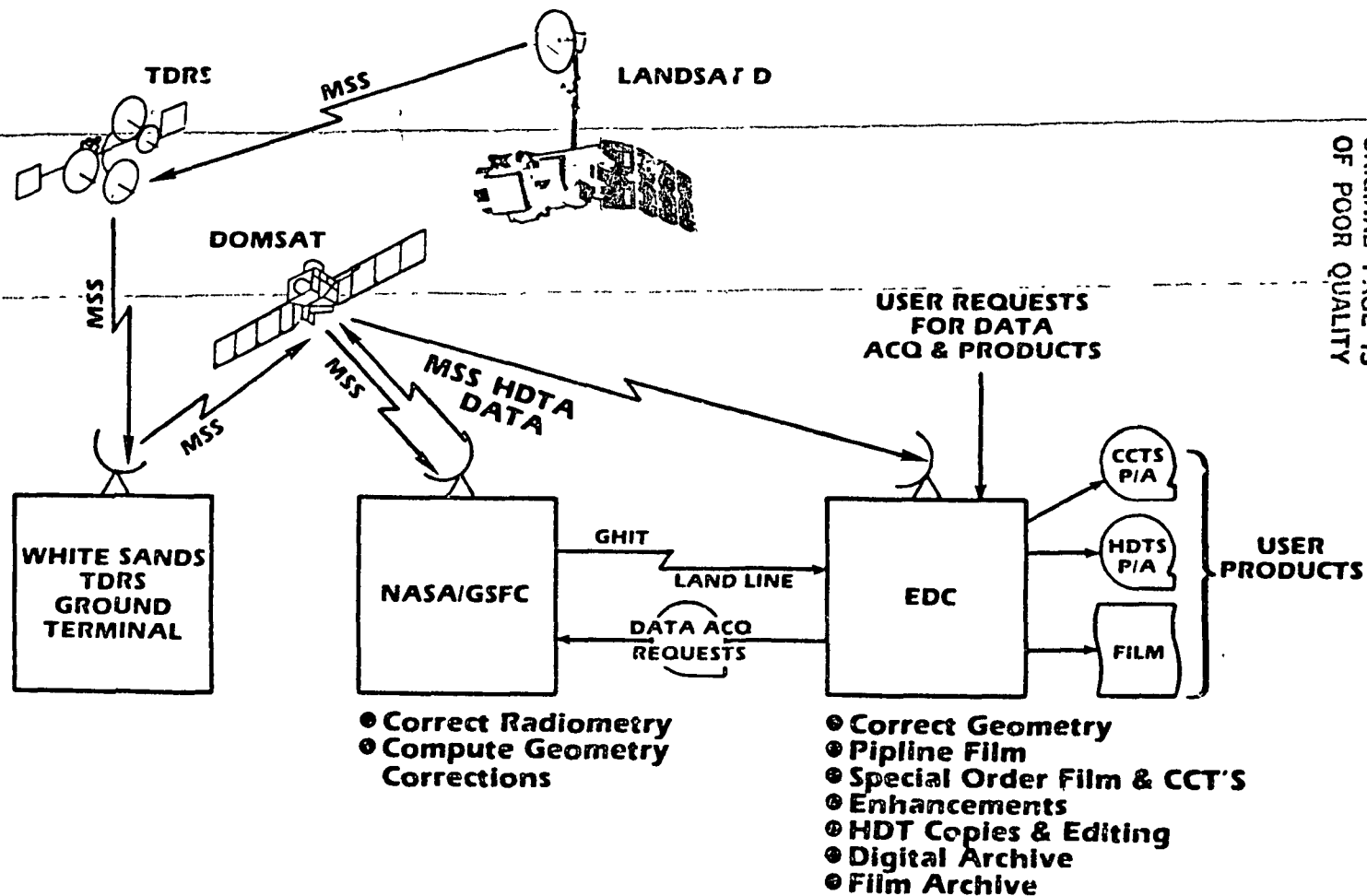
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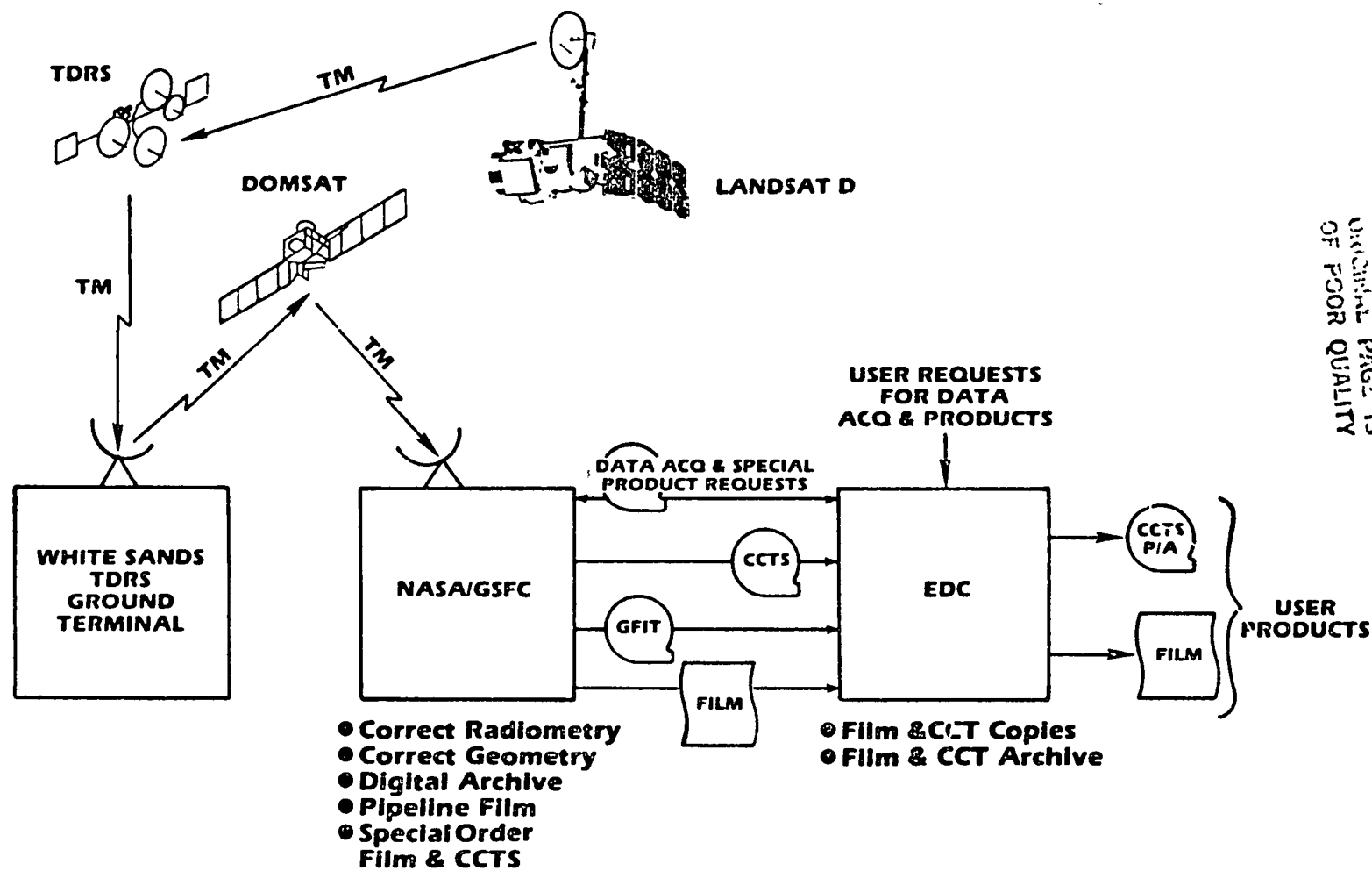
LANDSAT D MSS DATA FLOW



HDTA - Partially Processed High Density Tape Archival
GHIT - Goddard HDT Inventory Tape

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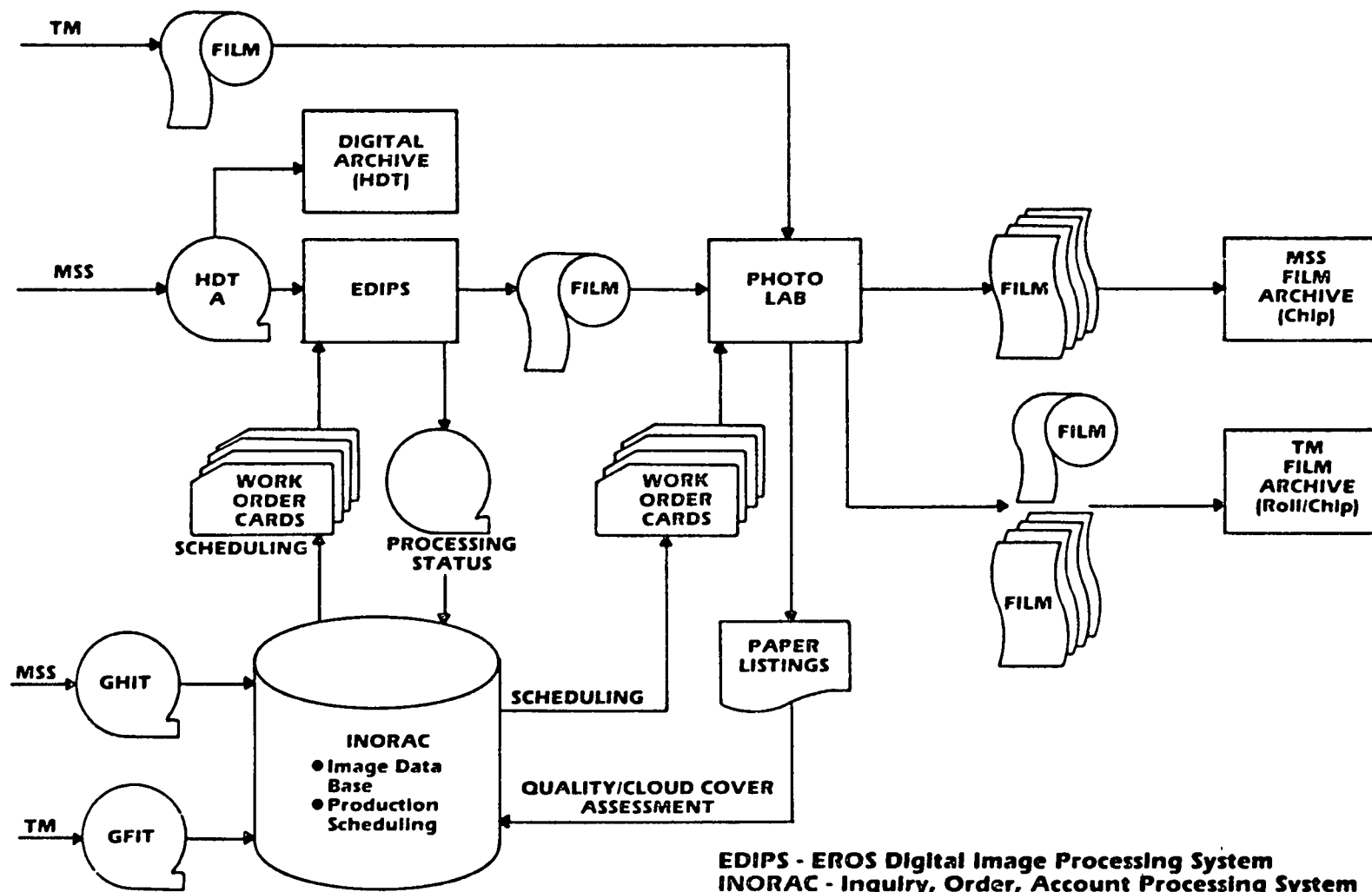
LANDSAT D TM DATA FLOW



GFIT - Goddard Film Inventory Tape

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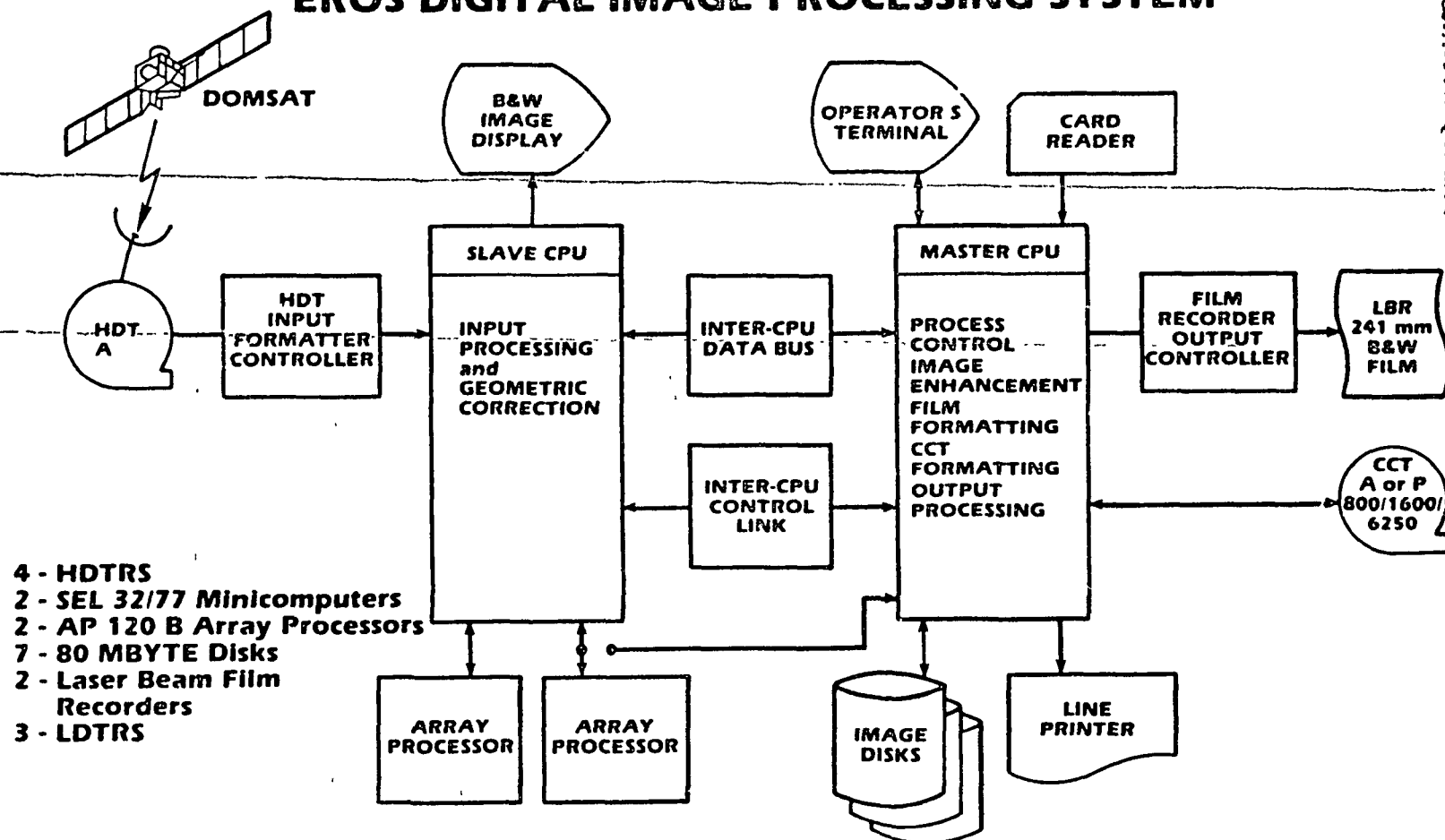
MSS AND TM PIPELINE PROCESS



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EDIPS - EROS Digital Image Processing System
 INORAC - Inquiry, Order, Account Processing System
 HDTA - Partially Processed High Density Tape Archival
 GHIT - Goddard HDT Inventory Tape
 GFIT - Goddard Film Inventory Tape

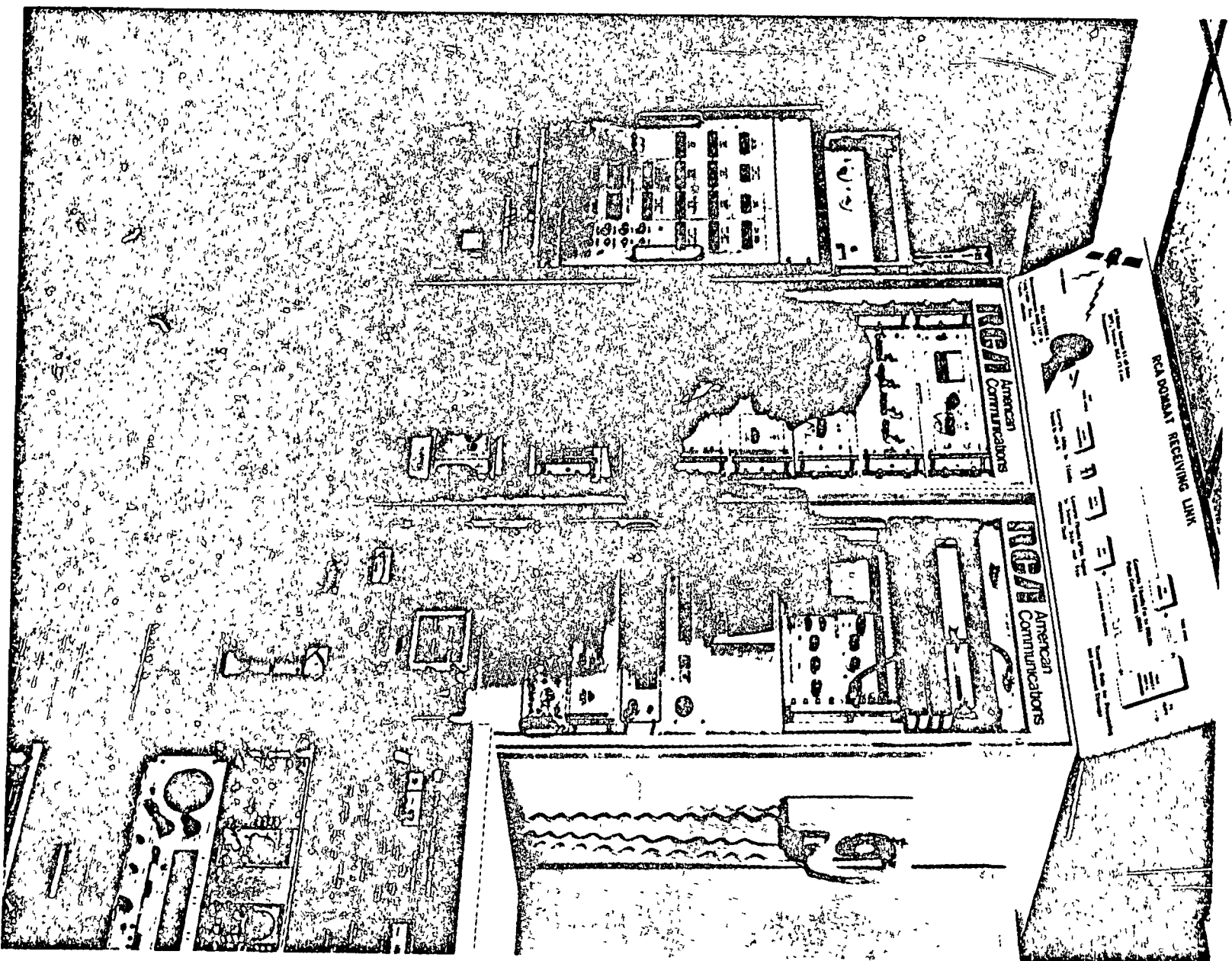
EROS DIGITAL IMAGE PROCESSING SYSTEM



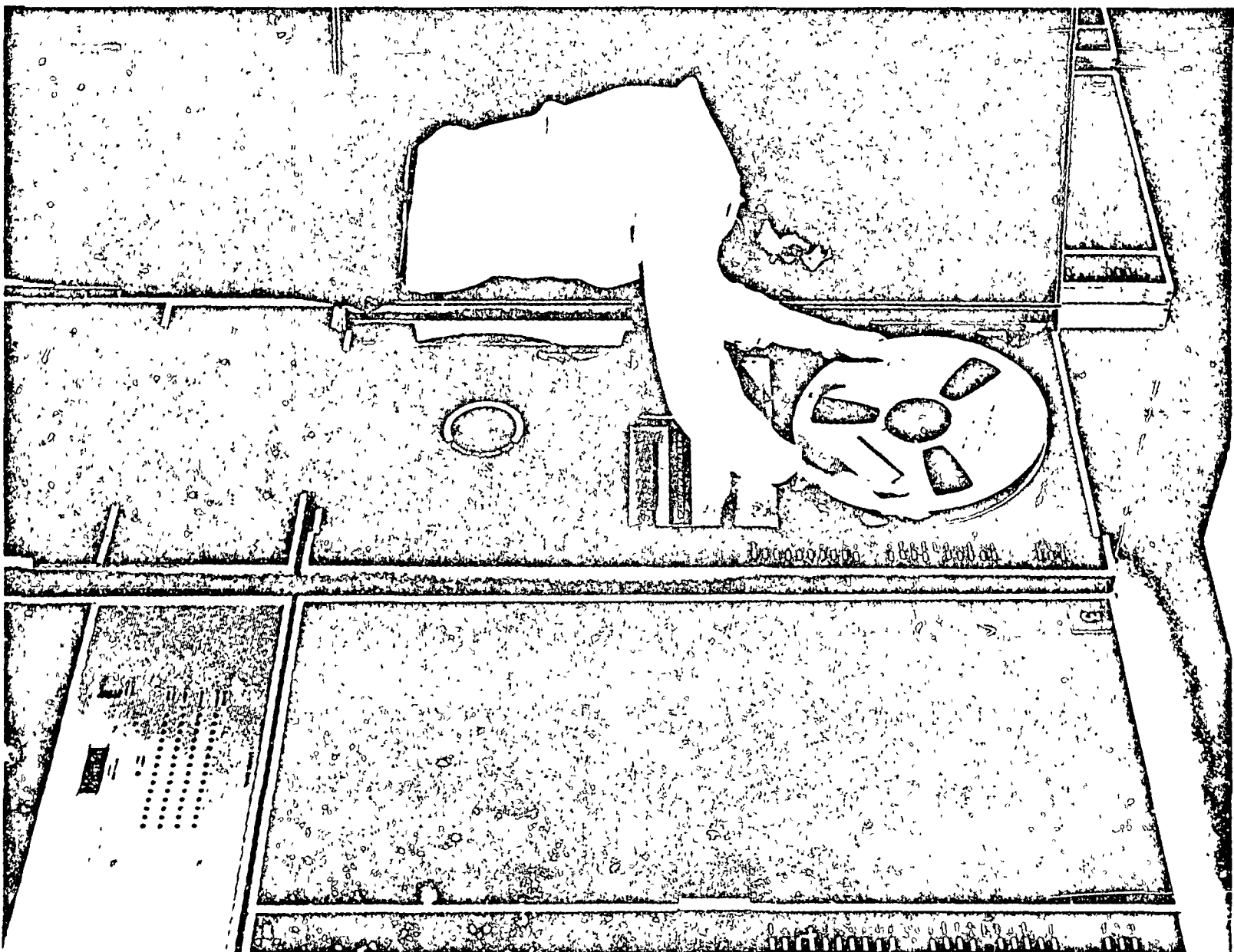
- 4 - HDTRS
- 2 - SEL 32/77 Minicomputers
- 2 - AP 120 B Array Processors
- 7 - 80 MBYTE Disks
- 2 - Laser Beam Film Recorders
- 3 - LDTRS

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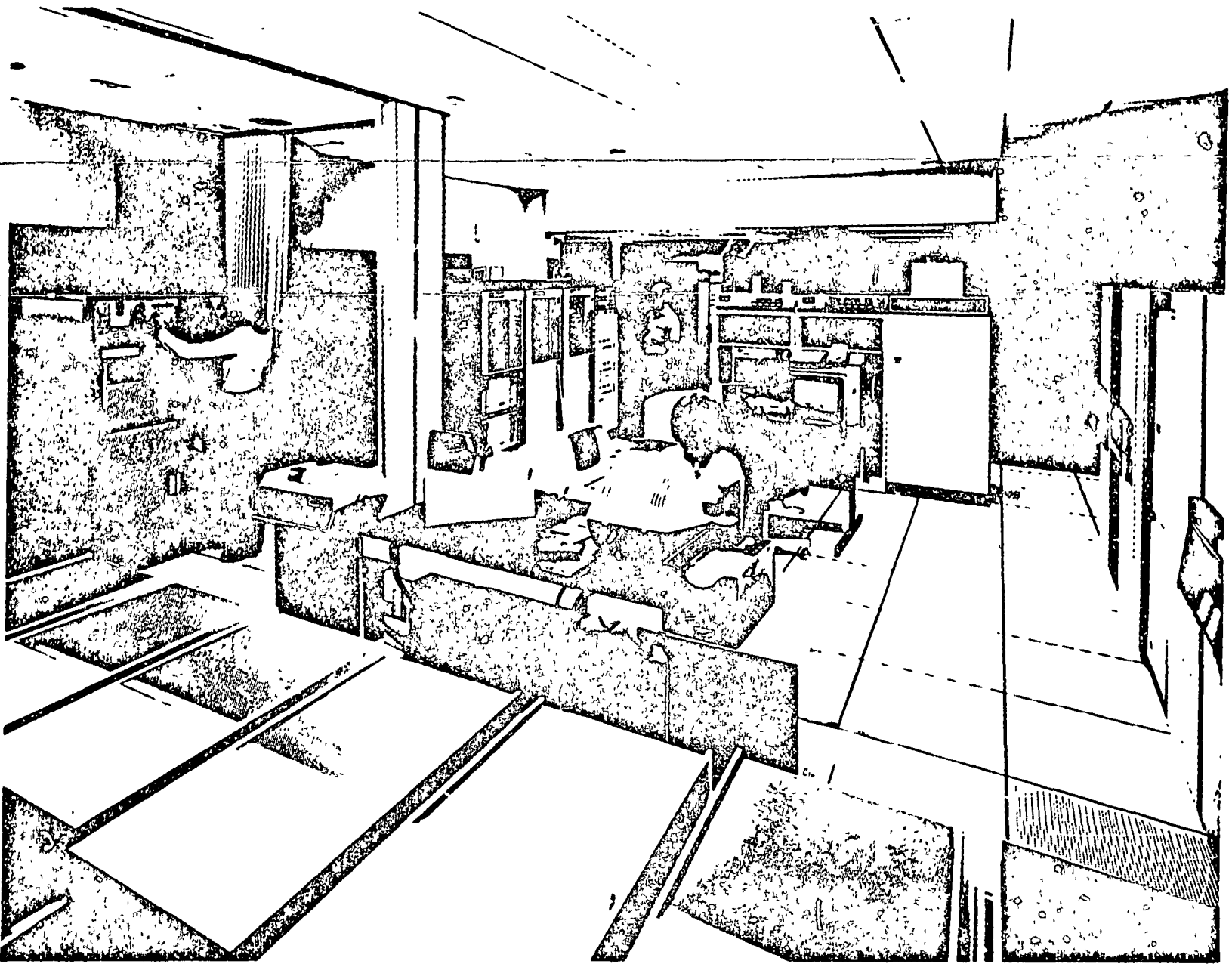
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C-2

EROS DATA CENTER

INQUIRY

ORDER

ACCOUNT

PROCESSING SYSTEM

(INORAC)

● **IMAGE DATA BASE**

● **ACCOUNTING & BILLING**

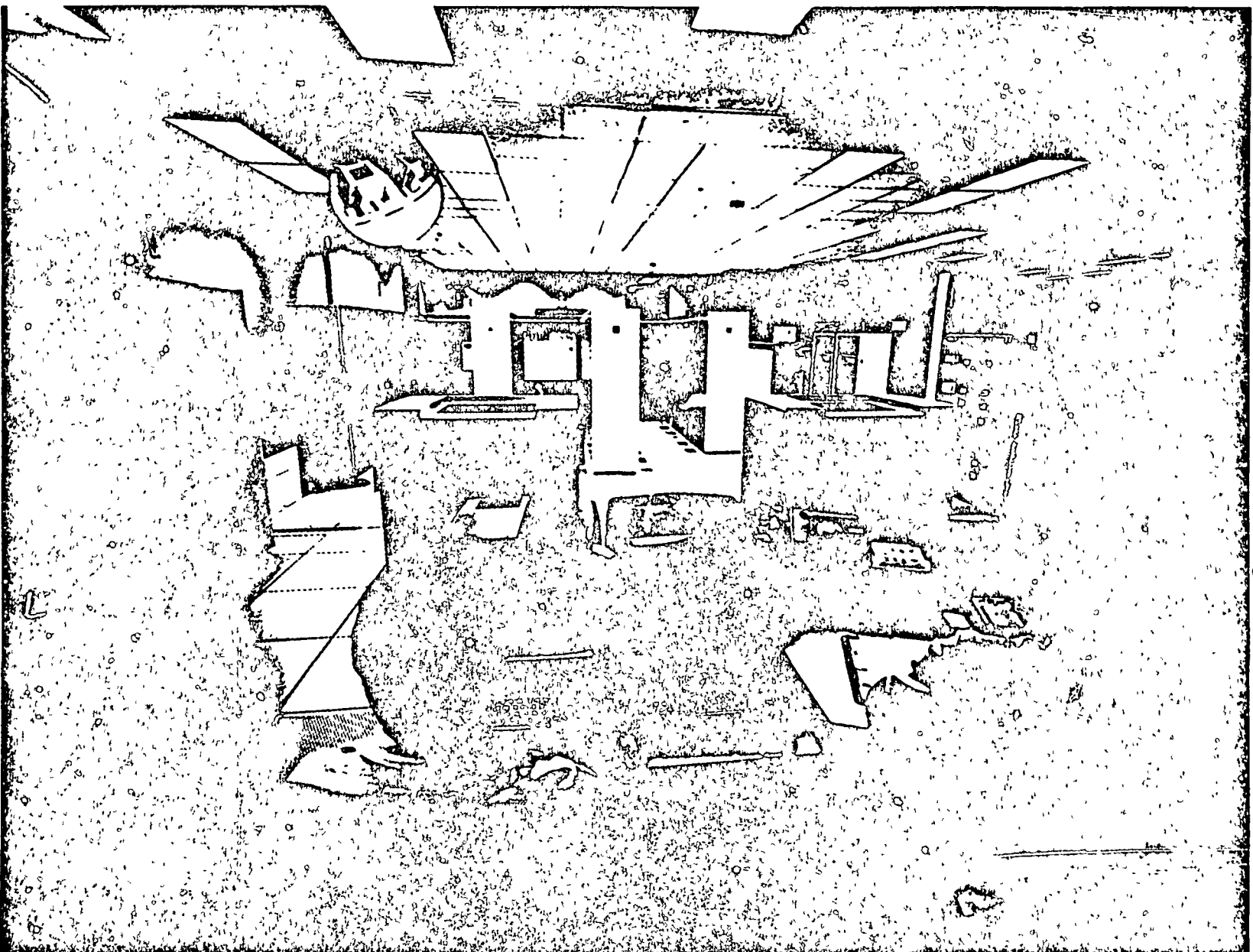
● **INQUIRY PROCESSING**

● **PRODUCTION MANAGEMENT**

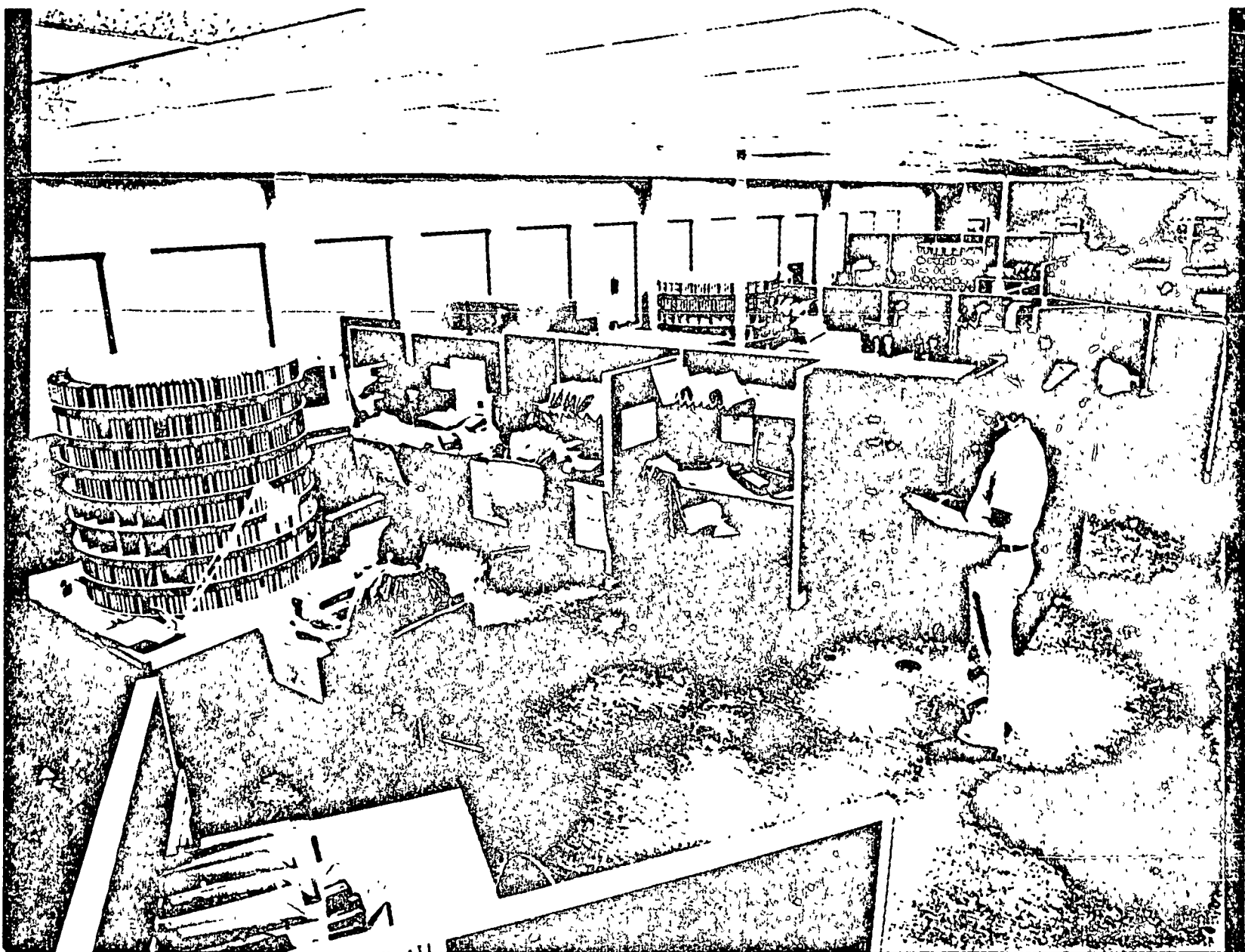
● **ORDER PROCESSING**

● **DATA ACQUISITION REQUESTS**

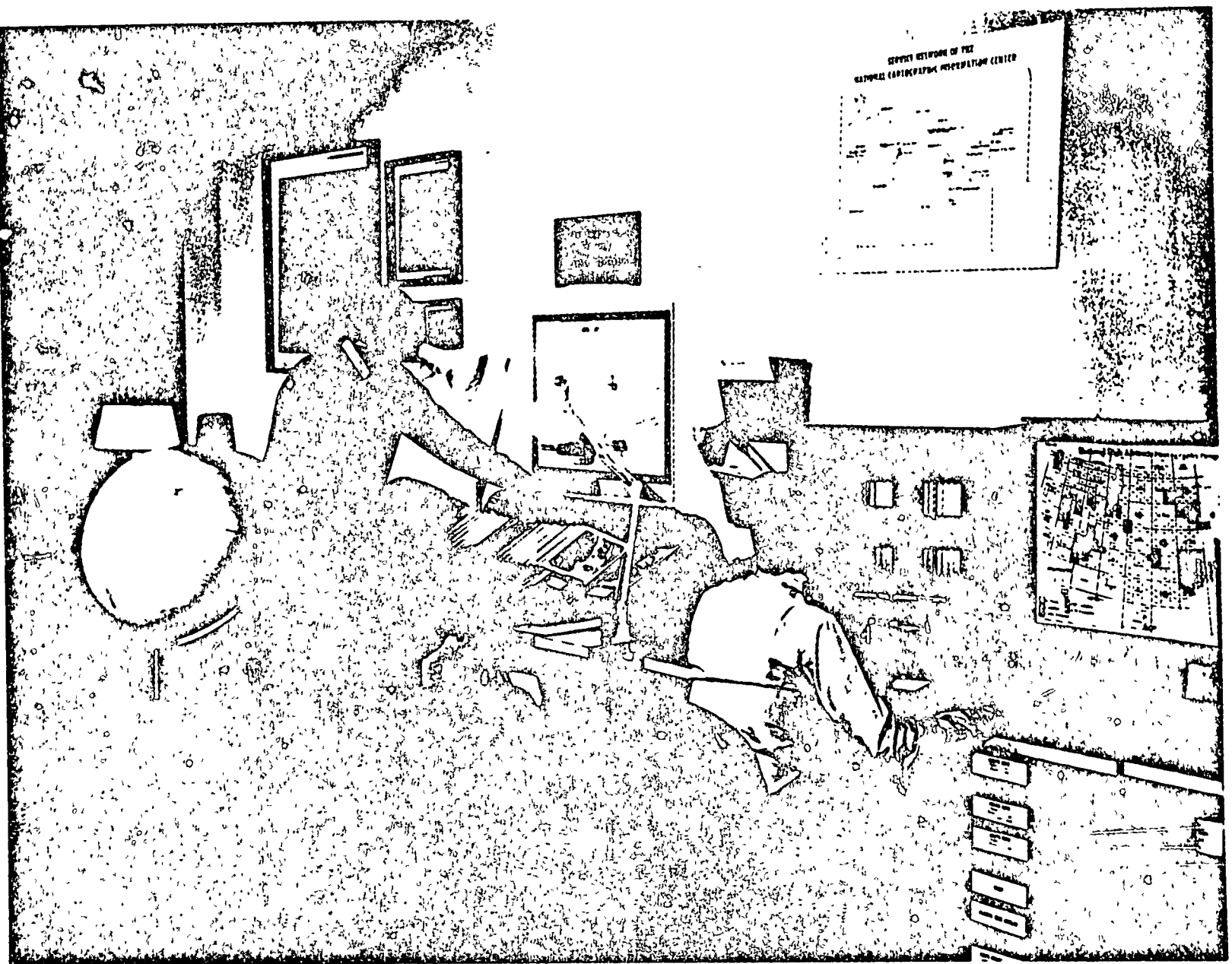
● **MANAGEMENT INFORMATION**



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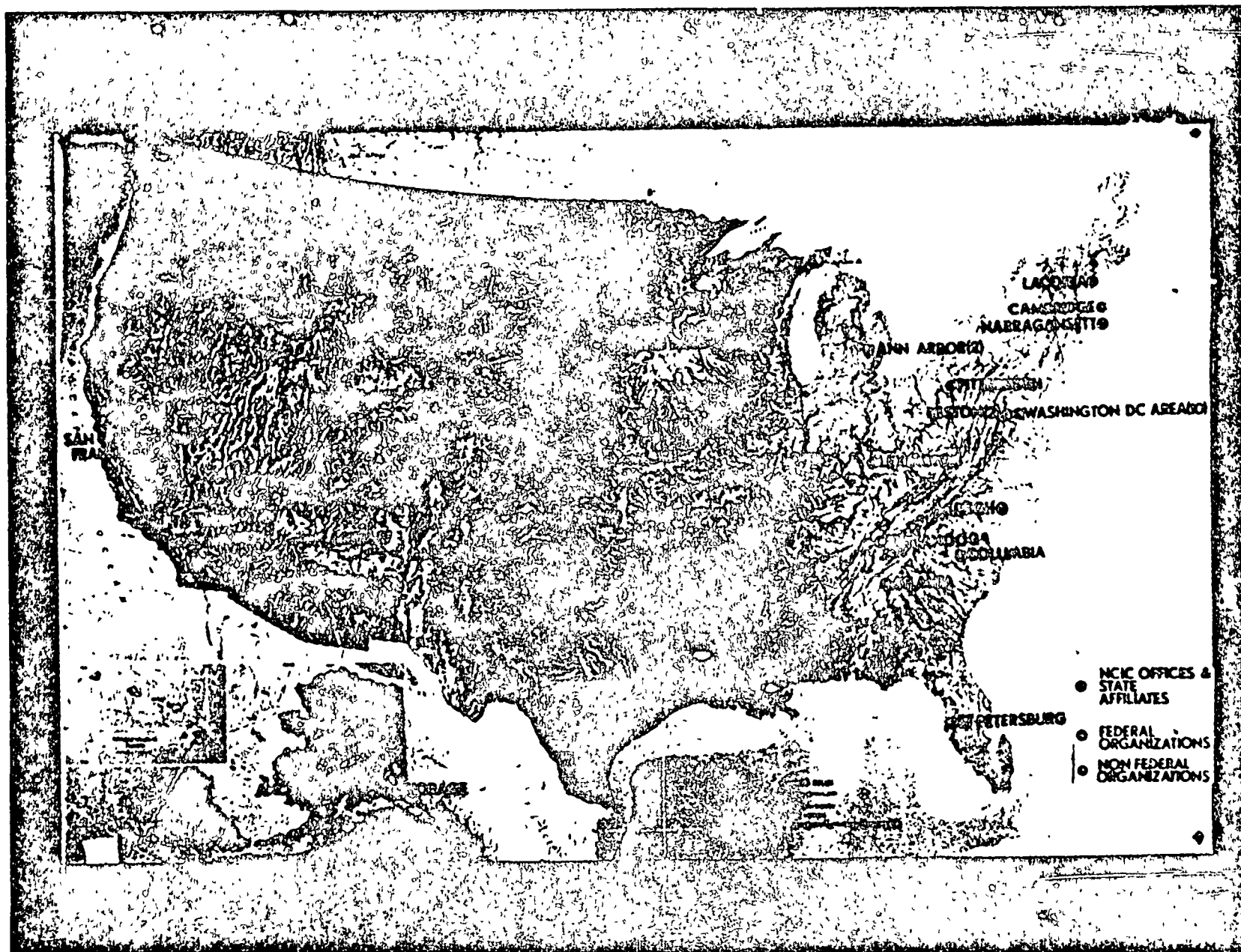


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REPORT HISTORY OF THE
NATIONAL EXPLOSION INVESTIGATION CENTER

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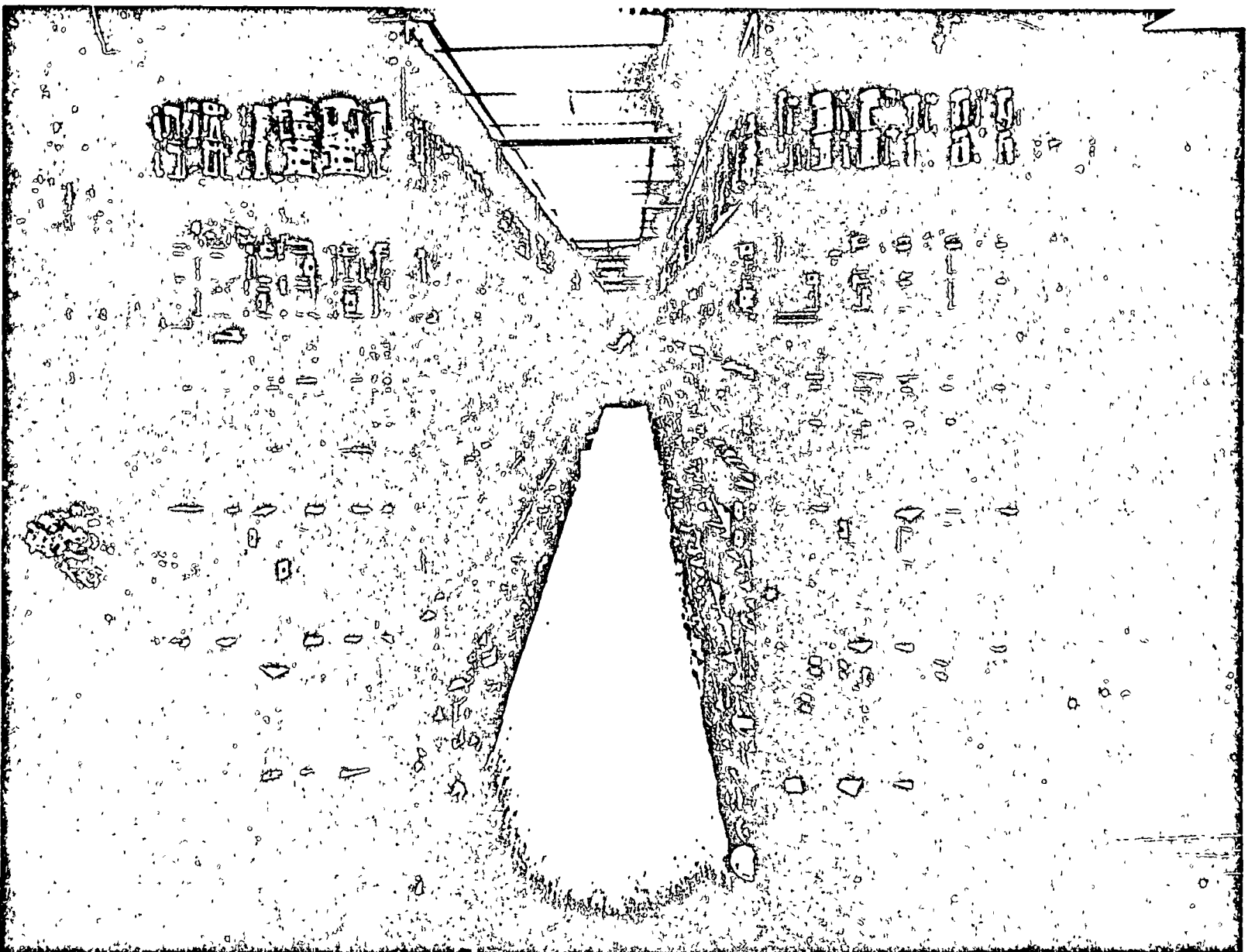
CURRENT LANDSAT ARCHIVE¹⁾

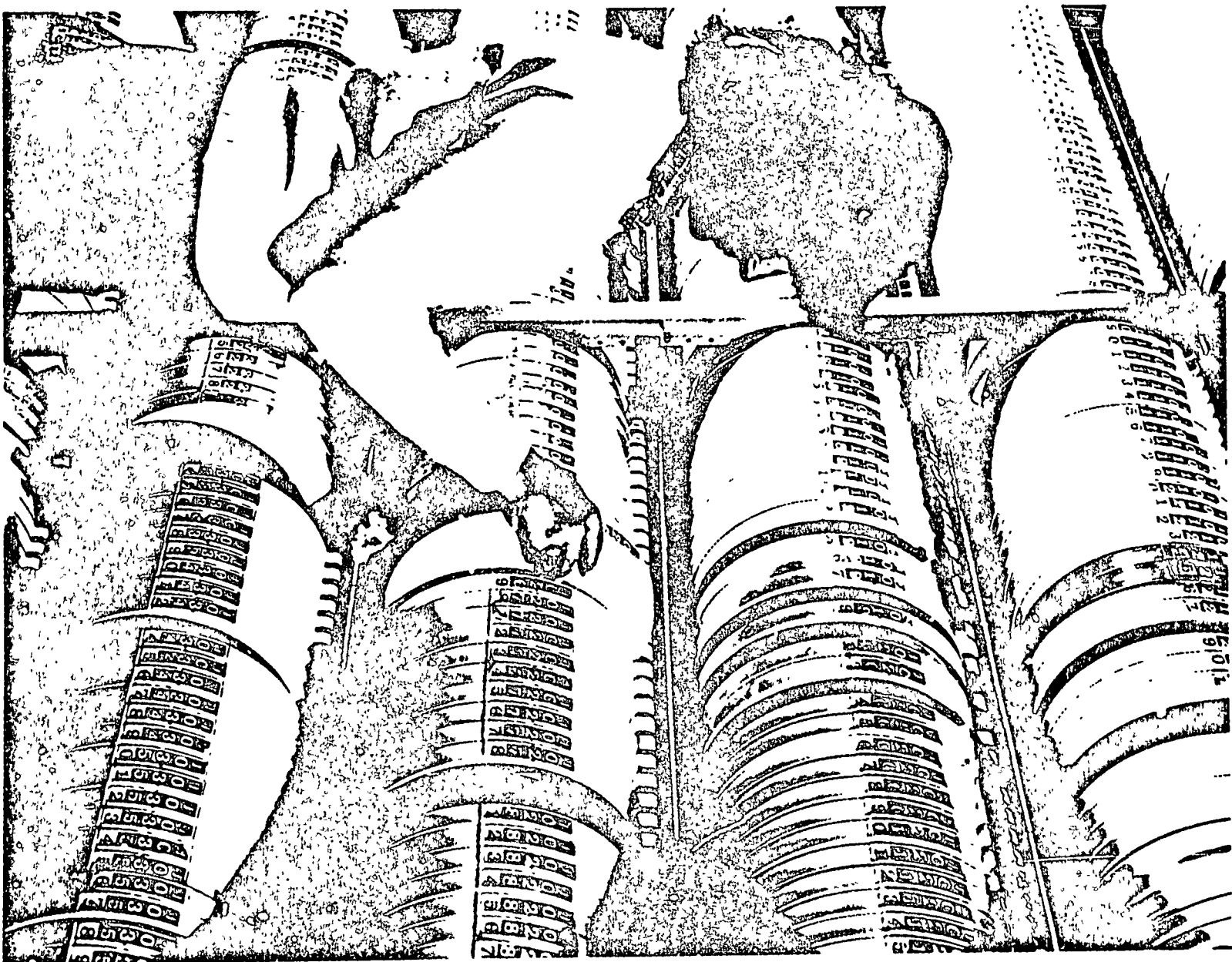
	<u>70 MM FILM</u>	<u>COMPUTER COMPATIBLE TAPE</u>	<u>241 MM FILM</u>	<u>HIGH DENSITY TAPE</u>	<u>TOTAL</u>
LANDSAT 1	146,081	9,973	-	-	156,054
LANDSAT 2	143,504	5,899	37,628	37,628	224,659
LANDSAT 3	<u>46,509</u>	<u>886</u>	<u>48,949</u>	<u>48,949</u>	<u>145,293</u>
TOTAL	336,094	16,758	86,577	86,577	526,006

1) SCENES ARCHIVED AS OF JANUARY 31, 1982.

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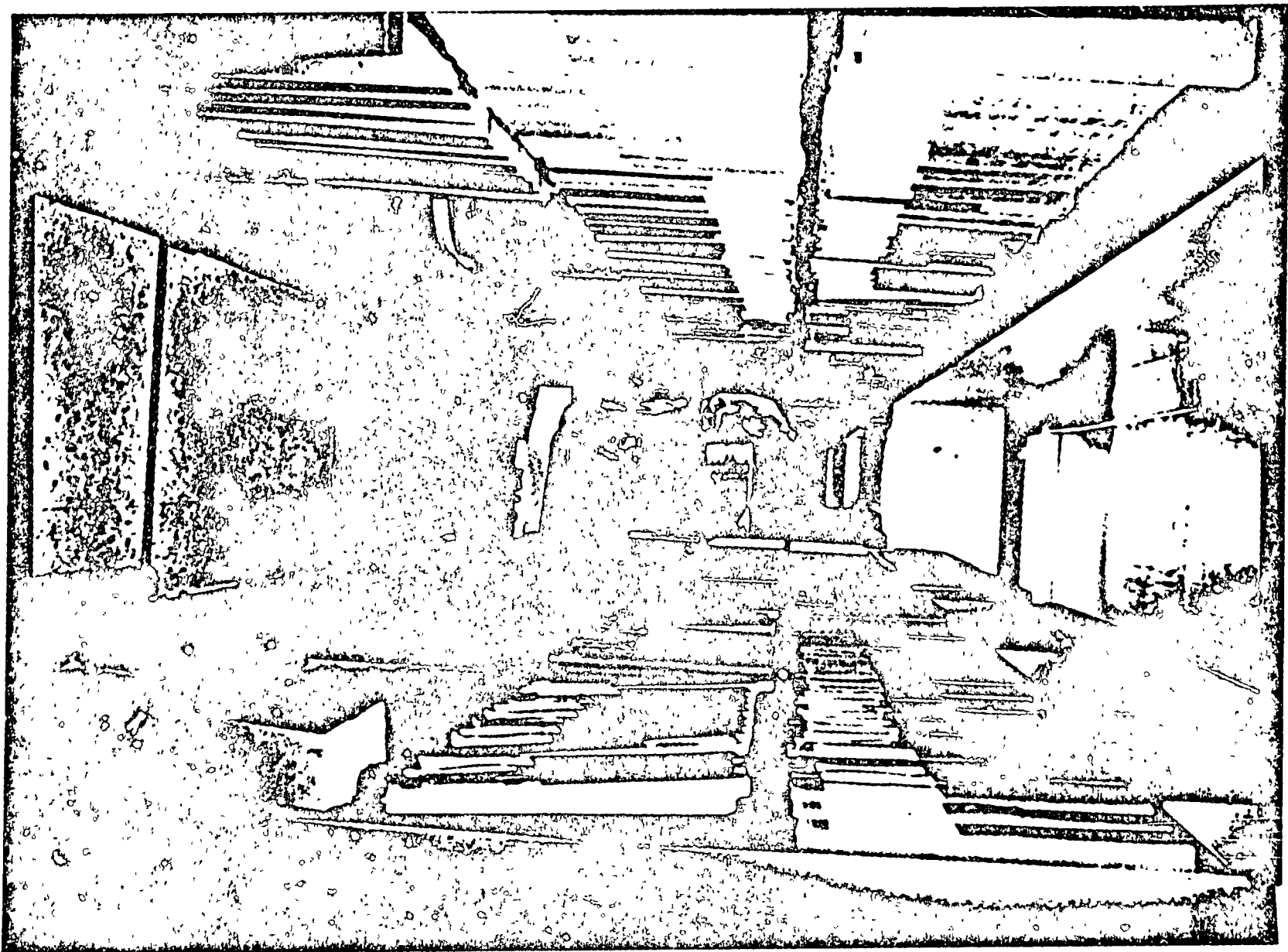




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LANDSAT D PRODUCTS

PHOTOGRAPHIC

	<u>IMAGE SIZE</u>	<u>FORMAT</u>	<u>BLACK-AND-WHITE</u>	<u>COLOR</u>
FILM	70 MM	POS & NEG	X	
	9" X 9"	POS & NEG	X	
	9" X 9"	POSITIVE		X
PAPER	9" X 9"	POSITIVE	X	X
	20" X 20"	POSITIVE	X	X
	40" X 40"	POSITIVE	X	X

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LANDSAT D PRODUCTS (CONT'D)

DIGITAL

COMPUTER COMPATIBLE TAPES (CCT'S) - 9 TRACK 800, 1600, & 6250 BPI

HIGH-DENSITY TAPES (HDT'S) -14 TRACK, 20,000 BPI

PARTIALLY CORRECTED & FULLY CORRECTED

ACCESSION AIDS

MICRO CATALOGS

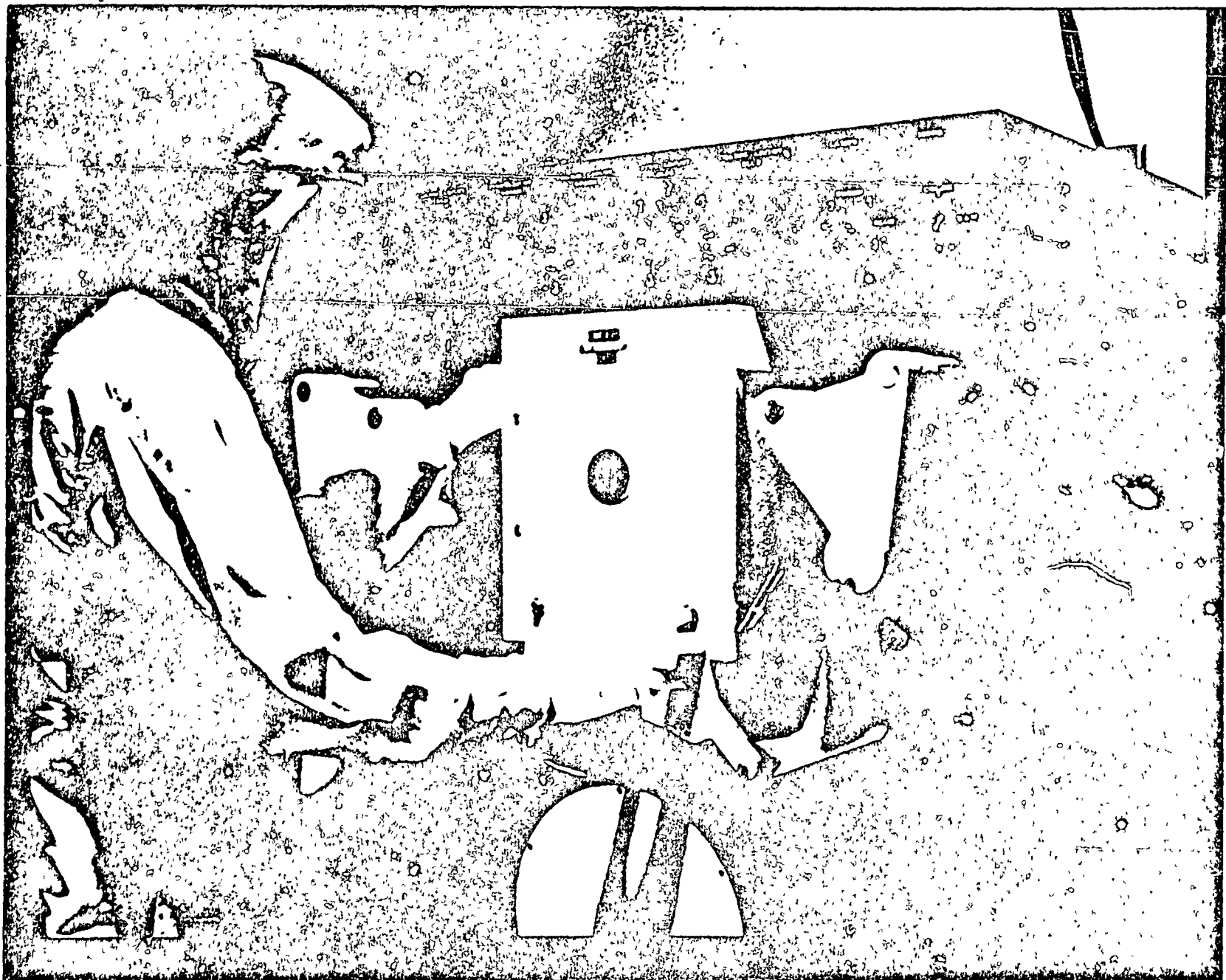
MICRO IMAGE FICHE

MICRO IMAGE FILM

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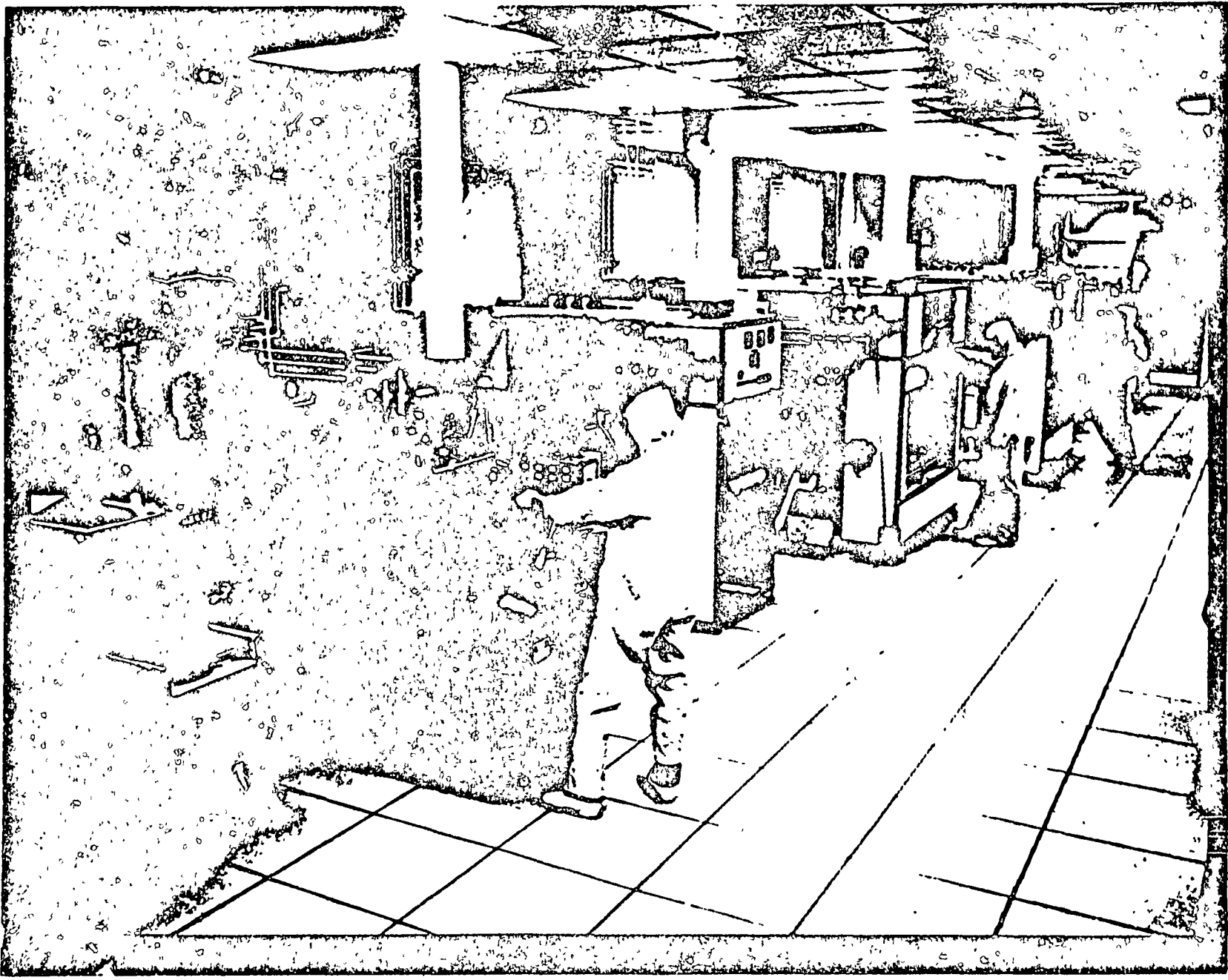
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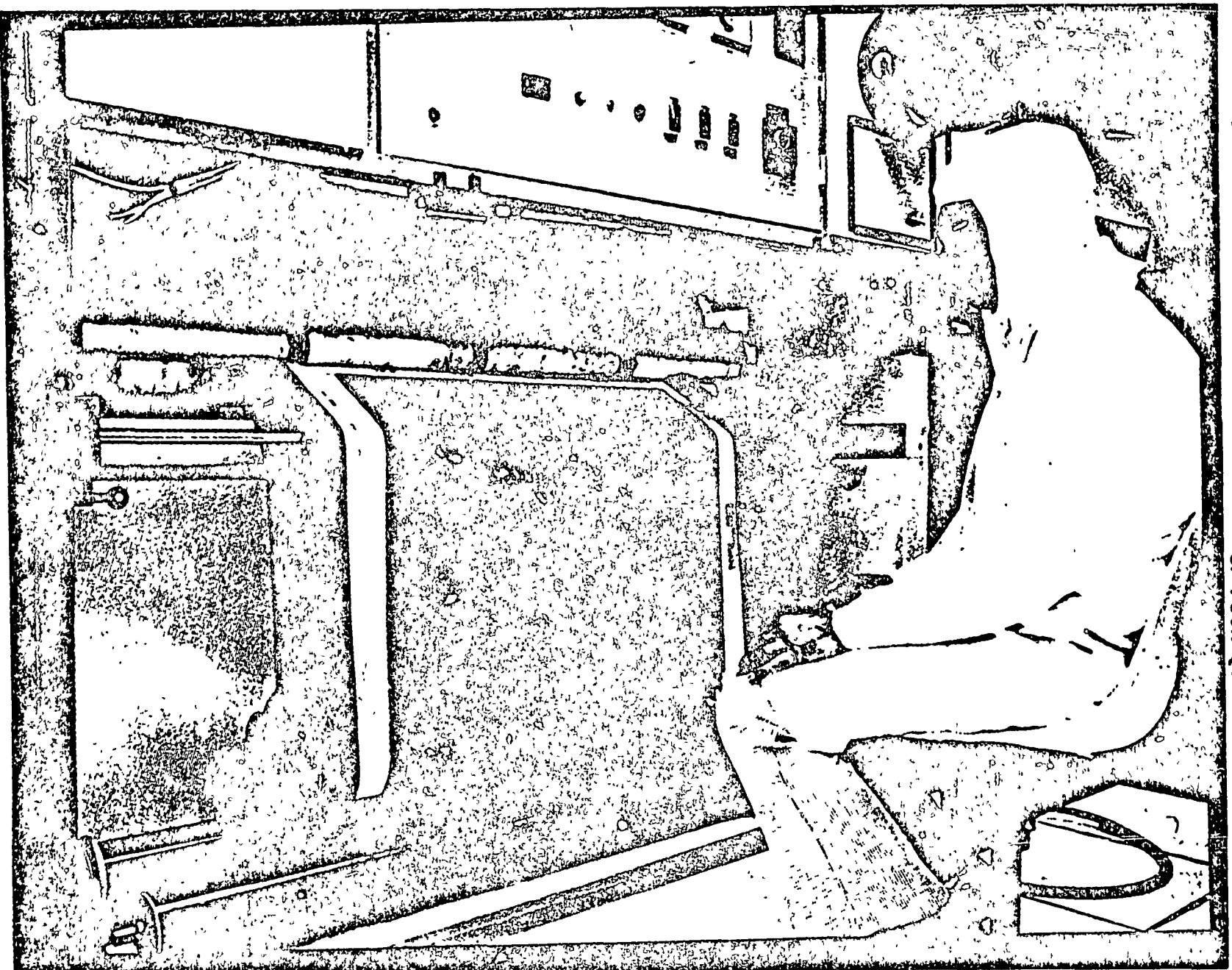


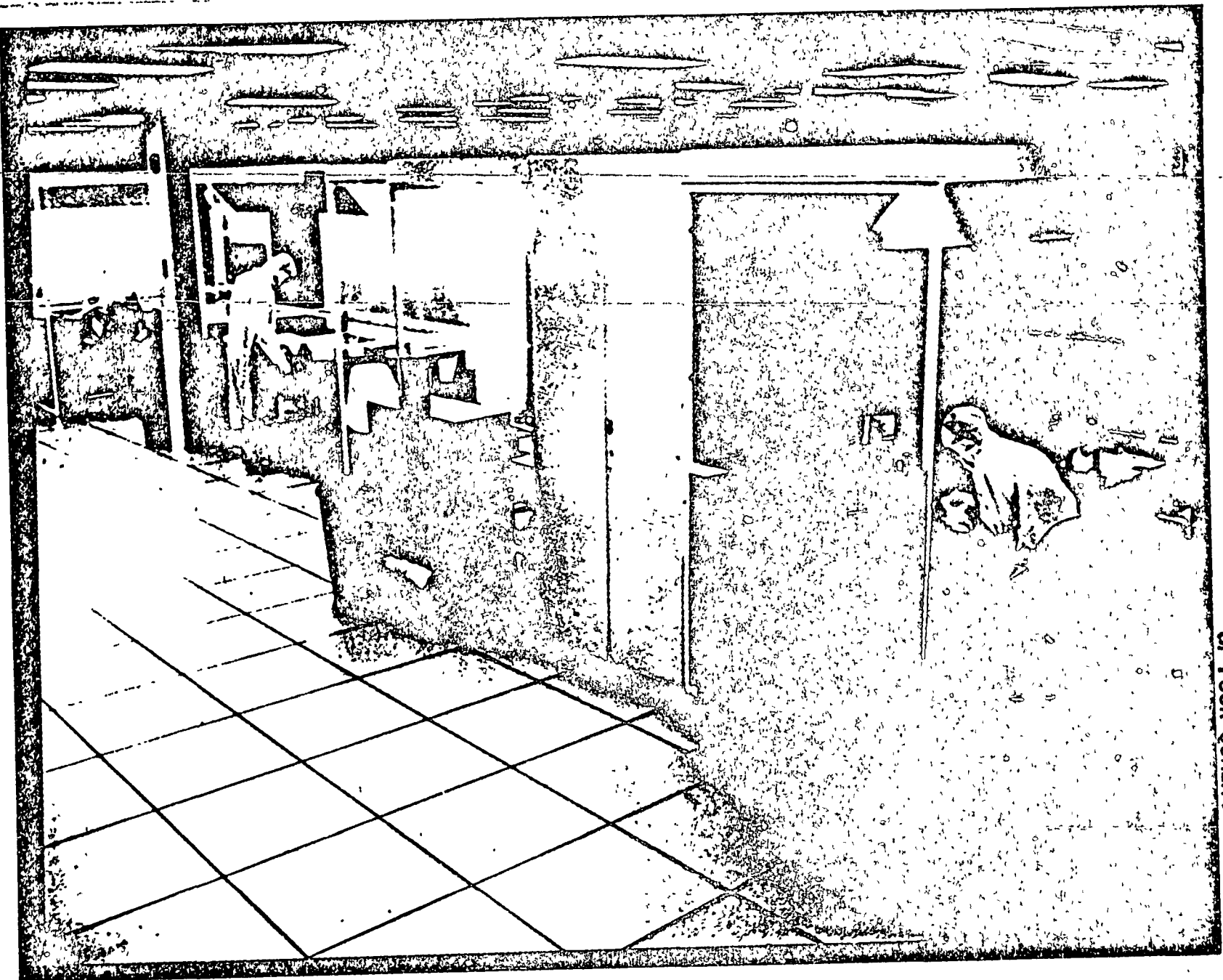
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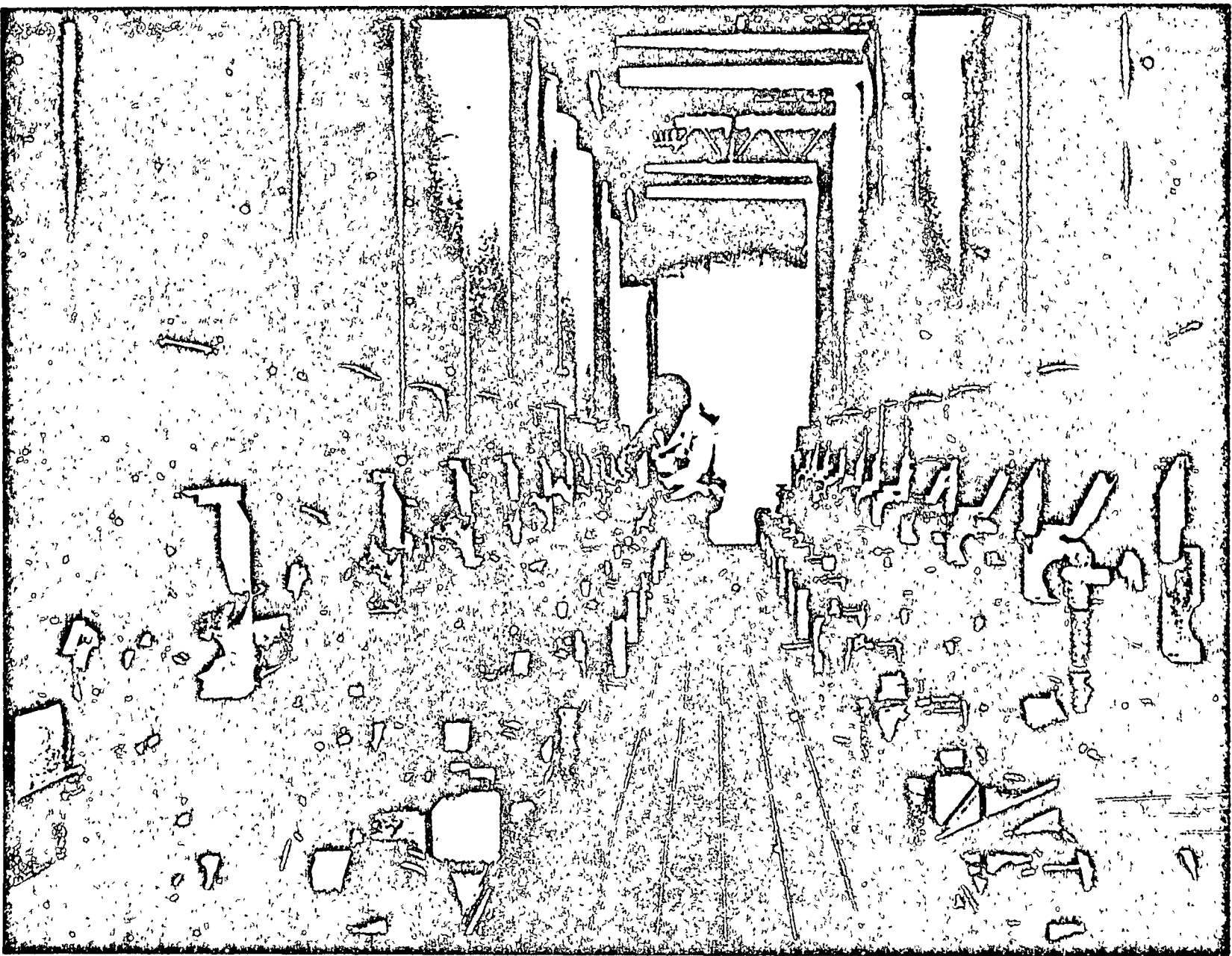


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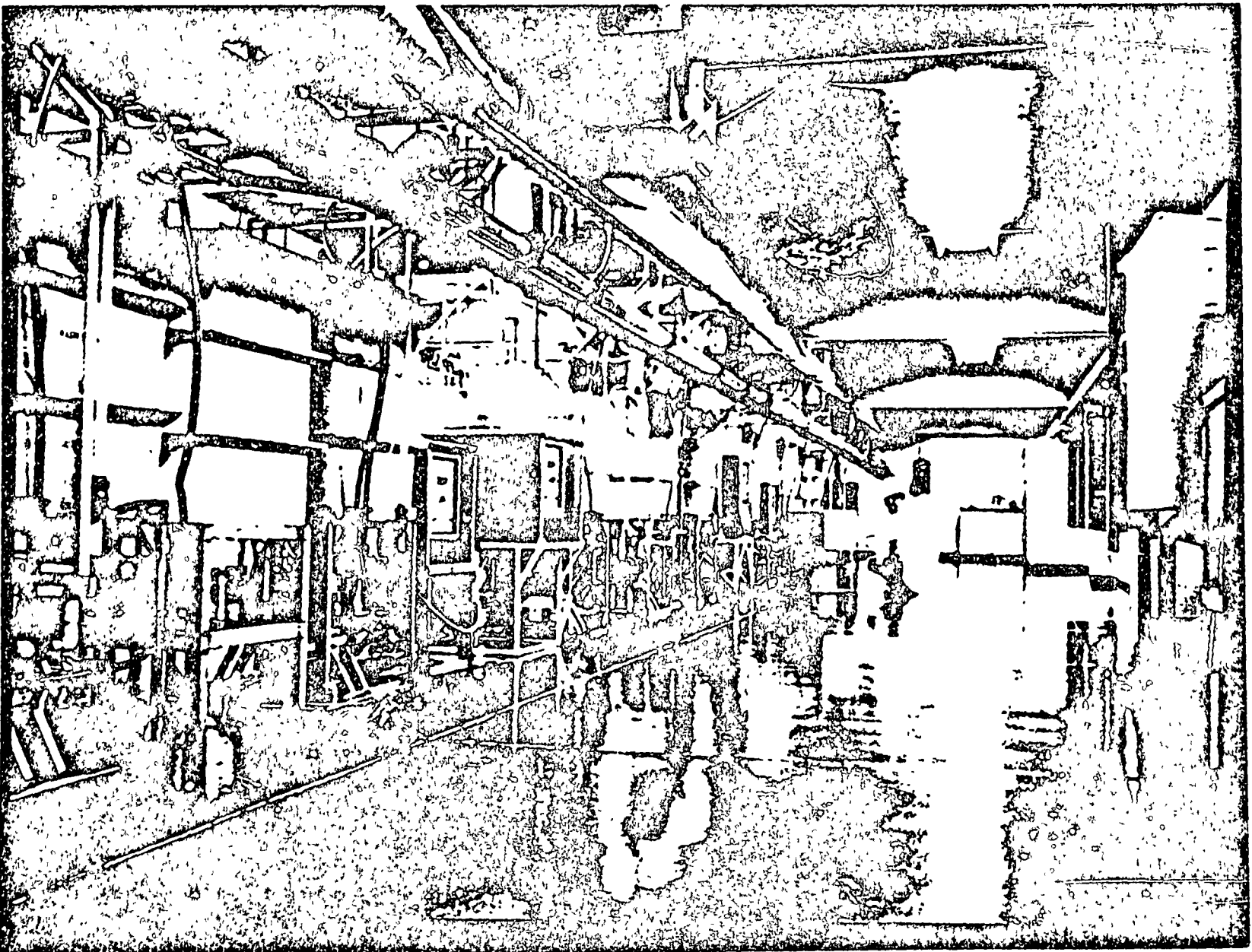


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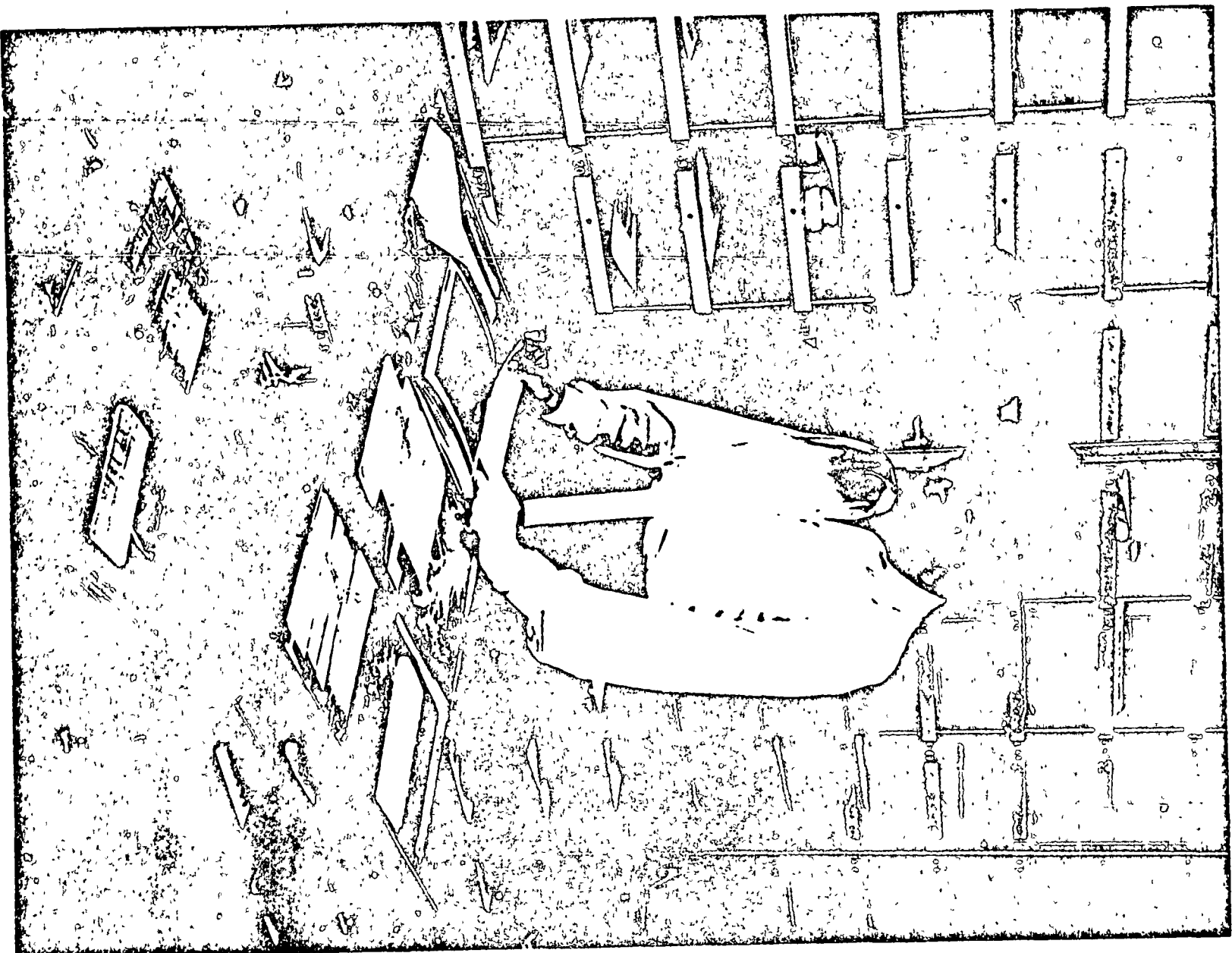


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